

# United States Department of Agriculture,

## OFFICE OF THE SECRETARY.

### NOTICE OF JUDGMENT NO. 1455.

(Given pursuant to section 4 of the Food and Drugs Act.)

#### ALLEGED ADULTERATION AND MISBRANDING OF COCA COLA.

On October 21, 1909, the United States Attorney for the Eastern District of Tennessee, acting upon a report of the Secretary of Agriculture, filed in the District Court of the United States for said district a libel praying condemnation and forfeiture of 40 barrels and 20 kegs of Coca Cola, in the possession of the Coca Cola Bottling Works, Chattanooga, Tenn. The barrels and kegs were labeled as follows: (Design of leaves and nuts). "Delicious and refreshing Coca Cola, manufactured by the Coca Cola Company, Atlanta, Toronto, Canada, Havana, Cuba, Philadelphia, Chicago, Los Angeles, Dallas. We guarantee the contents of this package to comply with the Food and Drugs Act of June 30, 1906. Our serial Number is 3324. The Coca Cola Company, By Asa G. Candler, Pt."

Analysis of samples of this product, made by the Bureau of Chemistry, United States Department of Agriculture, showed the following results—

|  |               |
|--|---------------|
| Caffein (grains per fluid ounce)-----  | 0. 92-1. 30   |
| Phosphoric acid ( $H_3PO_4$ ) (per cent)-----                                | 0. 26-0. 30   |
| Sugar, total (per cent)-----   | 48. 86-58. 00 |
| Alcohol (per cent by volume)-----  | 0. 90-1. 27   |
| Caramel, glycerine, lime juice, essential oils, and plant<br>extractive----- | Present.      |
| Water (per cent)-----  | 34. 00-41. 00 |

The libel alleged that the Coca Cola, after transportation from the State of Georgia into the State of Tennessee, remained in the original unbroken packages, and was adulterated and misbranded, in violation of the Food and Drugs Act of June 30, 1906, and was therefore liable to seizure for confiscation. In due course, the Coca Cola Company entered its appearance and excepted to the libel. The exceptions were

sustained in part, and thereafter the libellant, by leave of court, filed the following amended libel:

DISTRICT COURT OF THE UNITED STATES, SOUTHERN DIVISION, EAST-  
ERN DISTRICT OF TENNESSEE.

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|---|---|
| UNITED STATES OF AMERICA                    | } |
| <i>vs.</i>                                  |   |
| FORTY BARRELS AND TWENTY KEGS OF COCA COLA. |   |

AMENDED INFORMATION.

To the honorable E. T. SANFORD, judge, holding and presiding in said court.

This Amended Libel of the United States of America in and for the Southern Division of the Eastern District of Tennessee, prosecuted by the United States Attorney in and for said District, respectfully represents and shows:

I.

The Original Libel herein was filed by the United States of America through the District Attorney in and for the District aforesaid, and prayed seizure for condemnation of 40 Barrels and 20 Kegs of a certain article of food or food product, purported and represented to be "Coca Cola." Said condemnation was sought under Act of Congress commonly known as "Food and Drugs Act".

Pursuant to the prayer of said Original Libel, seizure of said food product was had, after which The Coca Cola Company, of Atlanta, Georgia, intervened and gave bond as in such cases provided, whereupon said food product, with the exception of one keg, was released.

Said seizure and condemnation were sought because of the matters in said Original Libel shown, all of which, together with other causes and grounds for seizure and condemnation, are hereinafter set forth.

II.

And in this behalf the United States of America, by this Amended Libel, represents that on or about the 18th of October, 1908, The Coca Cola Company, of Atlanta, Georgia, a corporation doing business in several States, and particularly in the States of Georgia and Tennessee, transported or caused to be transported for sale by an Interstate Carrier, from the City of Atlanta, Georgia, to Chattanooga, Tennessee, consigned to Coca Cola Bottling Works alone, or to it in connection with and for the use of itself and one or more other persons, partnerships, or corporations, a consignment of 40 barrels and 20 kegs of said food product, Coca Cola.

Said 40 barrels and 20 kegs of Coca Cola thus transported for sale were each and all labeled:

"Delicious and refreshing Coca Cola, manufactured by the Coca Cola Company, Atlanta, Toronto, Canada, Havana, Cuba, Philadelphia, Chicago, Los Angeles, Dallas. We guarantee the contents of this package to comply with the Food and Drugs Act of June 30, 1906. Our serial number is 3324.

"THE COCA COLA COMPANY,  
"By ASA G. CANDLER, Pt."

Said consignment of 40 barrels and 20 kegs was an interstate shipment and was received at Chattanooga on or about October 20, 1909, and on or about said date was seized under the original Information or Libel filed herein, and at the time of filing such original Information and of such seizure, said consignment of 40 barrels and 20 kegs of Coca Cola remained unloaded, unsold or in original unbroken packages, in Chattanooga, Tennessee.

Said food product, as above stated and described, was adulterated under the Act of Congress aforesaid, in this,

(a) Said product contained an added ingredient, caffeine, which was and is a poisonous ingredient, and might have rendered and may render said food product injurious to health.

(b) Said product contained an added ingredient, caffeine, which was a deleterious ingredient, and may render or might have rendered said food product injurious to health.

(c) Said food product had been mixed, colored, powdered, coated or stained by the use of sugar coloring, caramel and other coloring substances and by the use of certain flavoring substances, consisting of oil of lemon, sugar, syrup and lime juice, whereby damage or inferiority of the mixture (the food product, Coca Cola) was concealed, in this that said food product, in the mixing and preparation, contained germs emanating from the body, perspiration and spittle of the employes of The Coca Cola Company, engaged in mixing and making said food product; and it also contained germs due to divers unsanitary conditions, such as overhanging cobwebs, dirty factory, machinery, apparatus and appliances, insects of various kinds, flies, spiders and mice: Wherefore, and by reason of said germs and other substances above enumerated, together with the unsanitary surroundings and conditions incident to manufacture, said food product was of a damaged and inferior quality, which damage and inferiority was concealed by the flavoring and coloring aforesaid.

#### SECOND COUNT.

And said The Coca Cola Company of Atlanta, Georgia, transported or caused to be transported for sale the 40 barrels and 20 kegs of said food product, Coca Cola, as in the first count hereof

shown to Coca Cola Bottling Works, Chattanooga, Tennessee, alone, or for itself and another or others, labeled as in the first count shown.

And said consignment and transportation, made for the purpose of sale, was received by the consignee or consignees, one or all, on or about October 20, 1909, and on or about said date was seized under the Original Information filed herein, and at the time of such filing and seizure, said 40 barrels and 20 kegs remained unloaded, unsold or in original unbroken packages, in Chattanooga, Tennessee.

The shipper was a corporation, and for a number of years past engaged in the sale of said food product, and the said product thus transported and seized was misbranded in violation of the Food and Drugs Act of June 30, 1906, passed by Congress, in this,

(1) The label on each package, among other things, contained the statement "Delicious and Refreshing Coca Cola." The expression "Coca Cola" thus employed was and is a representation of the presence in said food product of the substances Coca and Cola. There are and were such substances popularly known as Coca and Cola, and under their own distinctive names, but said food product "Coca Cola" contained no Coca and little, if any, Cola.

Therefore, said food product is (1) an imitation of the articles or substances Coca and Cola, and (2) was offered for sale under the distinctive name of said two substances Coca and Cola.

(2) Each label on said barrels and kegs bore not only the said statement "Delicious and refreshing Coca Cola", among other things, but also a pictorial design of Coca leaves and Cola nuts, which was and is a suggestion and representation of the presence of Coca and Cola in said food product "Coca Cola". The Coca leaves were thus represented to be the leaves of the Coca plant, and the Cola nuts to be the fruit of the Cola plant.

Wherefore, said pictorial design was a representation and suggestion of the presence of both Coca and Cola in said food product, when in truth it did not contain any Coca and contained little, if any, Cola in its composition, and thus said statement and pictorial design appearing on said labels and packages were and are false and misleading statements and designs regarding the ingredients and substances contained in said barrels, kegs and product.

### III.

Wherefore, The United States of America prayed in the original Libel that process issue and that the United States Marshal of this District be commanded to seize the barrels and kegs aforesaid for condemnation, confiscation and to be dealt with as the law directs and this Honorable Court might determine, which prayer is here and now adopted and renewed, and the Honorable Court is further asked to

proceed as in cases of admiralty, so far as is applicable, and that by appropriate order the article of food and food product aforesaid be condemned at the suit of this libelant, according to Act of Congress, and that the intervenor and claimant be charged with all the costs of this cause and required to pay such further sums and penalties as warranted by Statute.

And Libelant further prays for such other, further and general relief as the nature of the case may require.

Whereupon the claimant answered said amended libel as follows:

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE SOUTHERN  
DIVISION OF THE EASTERN DISTRICT OF TENNESSEE.

|   |   |                                |
|---|---|--------------------------------|
| <p>THE UNITED STATES<br/><i>vs.</i><br/>FORTY BARRELS &amp; TWENTY KEGS<br/>of Coca Cola.</p> | } | Answer to amended information. |
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Now comes the Coca Cola Company, defendant to said cause, and for answer to the amended information filed in said cause, says:

1. "Defendant admits the averments in paragraph I of said amended information.

2. "Defendant admits that it is a corporation as alleged; that it shipped, as averred, forty barrels and twenty kegs of a food product, known as Coca-Cola, and that said forty barrels and twenty kegs were each and all labeled as follows:

'Delicious and refreshing Coca-Cola, manufactured by The Coca-Cola Company, Atlanta, Toronto, Canada, Havana, Cuba, Philadelphia, Chicago, Los Angeles, Dallas. We guarantee the contents of this package to comply with the requirements of the Food and Drugs Act of June 30, 1906. Our serial number is 3324.

'THE COCA-COLA COMPANY  
'By ASA G. CANDLER, Pt.'

"It is admitted that said consignment was an interstate shipment; that it was received by the consignee in Chattanooga, Tennessee, on or about the date stated in the information; and that it remained in the original unbroken packages, in Chattanooga, Tennessee, and in the possession of the consignee at the time it was seized by the Marshal under the attachment issued in this cause.

"(a) It is admitted that said food product contained as one of the ingredients, a small proportion of caffeine, but it is denied that the caffeine as so contained was or is an added ingredient, and it is denied that the caffeine was or is a poisonous ingredient, which might have rendered or may render said food product injurious to health.

“(b) It is denied that the caffeine as so contained was or is an added ingredient, and it is denied that the caffeine as contained in the food product was or is a deleterious ingredient, which may render or might have rendered said food product injurious to health.

“(c) Defendant denies each and every averment contained in subsection (c) of Paragraph II of said amended information.”

### “III.

“(1) Defendant denies that the expression ‘Coca-Cola’, as used on the labels on said packages, was or is a representation of the presence in said food product of the substances Coca and Cola; and denies that there are such substances known as Coca and Cola under their own distinctive names. But said product does contain certain elements or substances derived from coca leaves and cola nuts.

“(2) Defendant denies that said product is or was an imitation of, or is or was offered for sale under the distinctive name of any other article.”

“(3) Defendant denies that the labels on said barrels and kegs bear any statements or pictorial design regarding the ingredients and substances contained therein which are false or misleading in any particular.

“(4) And for further answer, defendant says that the name of said food product, as contained on the labels aforesaid, to wit, ‘Coca-Cola’ is the distinctive name of the said product, under which said product is now known and sold, and has been known and sold for more than twenty years past, as an article of food; that said food product is a mixture or compound, which does not contain any added poisonous or deleterious ingredient, and is not an imitation of or offered for sale under the distinctive name of any other article; and that said name is accompanied on the same label with a statement of the places where said article is manufactured or produced.

“Wherefore, defendant pleads and says that said article is not to be deemed adulterated or misbranded, under the provisions of said Food and Drugs Act of June 30, 1906.

“(5) Each and every allegation of said amended information not hereinbefore specifically admitted or denied is now denied.”

On March 13, 1911, the case coming on for trial and the claimant having demanded trial by jury of the issues of fact joined in the case, a jury was duly empaneled and sworn. Upon the conclusion of the testimony for both libellant and claimant, counsel for claimant moved the court for peremptory instructions to the jury on the points which fully appear in the judgment of the court hereinafter set forth.

The court, after hearing argument of counsel on said motion, rendered the following opinion:

THE COURT: I have reached conclusions on the Claimant's motion for peremptory instructions.

1. The chief question in this case arises under the allegations of the Government's libel that the food product, Coca-Cola, which it seeks to condemn, is adulterated in that it contains "an added ingredient, caffeine," which is alleged to be a poisonous and deleterious ingredient that may render such food product injurious to health.

Assuming, for the purpose of determining this motion that if the caffeine, which is admittedly contained in the Coca-Cola in the proportion of about one and one-fifth grains to each fluid ounce of the syrup, is an "added" ingredient within the meaning of the Food and Drugs Act, there is such conflict in the evidence as to whether it is a deleterious ingredient which may cause injury to the health that the question of its qualities and effect should be submitted to the jury for determination, as a question of fact and not of law, the preliminary question arises, whether upon the undisputed evidence in this case, it can be deemed an "added" ingredient to the Coca-Cola within the meaning of the Food and Drugs Act, so that its presence can in any event cause an adulteration of that article within the meaning of the Act.

The material provisions of the Act, in so far as they bear upon this question, are as follows:

By Section 6 it is provided that the term "food" as used therein, shall include all articles used for food, drink, confectionery or condiment by man or other animals, whether simple, mixed, or compound.

By Section 7 it is provided that confectionery shall be deemed to be adulterated if it contain any "mineral substance or poisonous color or flavor, or other ingredient deleterious or detrimental to health" and that an article of food shall be deemed to be adulterated "if it contain any *added* poisonous or other *added* deleterious ingredient which may render such article injurious to health."

By Section 8 it is provided that an article of food shall be deemed to be misbranded "If the package containing it, or its label, shall bear any statement, design or device regarding the ingredients or the substances contained therein, which statement, design, or device shall be false or misleading in any particular; Provided, That an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in the following cases; First. In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food, under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another

article, if the name be accompanied on the same label or brand with a statement of the place where said article has been manufactured or produced,” and “Provided further, that nothing in this Act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods which contain no unwholesome *added* ingredient to disclose their trade formulas, except in so far as the provisions of this Act may require to secure freedom from adulteration or misbranding.”

And by Section 11 it is provided that if it shall appear to the Secretary of Agriculture upon examination of samples “That any article of food or drug offered to be imported into the United States is adulterated or misbranded within the meaning of this Act, or is otherwise dangerous to the health of the people of the United States, such article shall be refused admission.”

In determining the meaning and effect of these provisions of the Act, I have been greatly aided by the argument of counsel for both parties, who have clearly and forcibly stated their respective contentions, and who have conducted the case throughout with signal ability, learning, and effectiveness.

Comparing then these several provisions of the Act, so as to give each its reasonable and just meaning, consistently with each other and in accordance with the general purpose of the Act, I am constrained to conclude that the use of the word “Added ” as applied to poisonous and deleterious ingredients in articles of food other than confectionery, in sections 7 and 8 of the Act, can not be regarded as meaningless, and that by contrast with the provision in Section 8 that “confectionery,” which is usually an artificial compound, shall be deemed to be adulterated if it contain any “ingredient deleterious or detrimental to health ” and with the provision in Section 11 that admission may be refused to any food or drug offered to be imported into the United States if it be adulterated or misbranded within the meaning of the Act or “otherwise dangerous to the health of the people of the United States,” it was intended to provide by Sections 7 and 8 that any articles of food manufactured and sold in this country in interstate commerce should not be deemed to be adulterated merely because they contained a poisonous or deleterious ingredient, except in the case of confectionery, but that all other articles of food, whether simple or compound, were not to be deemed adulterated on account of the presence of a poisonous or deleterious ingredient unless such ingredient was “added ” to the article of food in question, that is, was an ingredient foreign to its natural or normal constituency ; and that this distinction applies by the specific provisions of Section 8 to compound articles of food known under their own distinctive names not an imitation of or offered for sale under the distinctive



name of any other article, and properly labeled as to the place of manufacture.

Thus a natural article of food, for example, coffee, can not be deemed adulterated, even although the average cup contains a larger amount of caffeine than an ordinary drink of Coca-Cola, and even if caffeine may be properly regarded as a deleterious ingredient injurious to health, since such caffeine is clearly not an added ingredient to the coffee foreign to its composition, but is one of the essential ingredients naturally and normally entering into its composition. So an article of food which is not sold under a distinctive trade-name but under a well recognized name that has acquired a distinct meaning in general popular usage, as for example, sausage can not be deemed adulterated within the meaning of the Act, however deleterious to health some of its normal ingredients may be, provided that, as manufactured and sold, it does not contain any other poisonous or deleterious ingredients added to its normal and customary constituents. And so, likewise, I think it is clear from the provisions of the Act that a compound article of food which is manufactured and sold under its own distinctive name and properly labeled, with whose qualities and effect the public has been familiar, and for which they see fit to buy it, is not to be adulterated within the meaning of the Act, provided that when manufactured and sold under this distinctive name it contains no poisonous or deleterious ingredients in addition to its normal and customary constituents as it has been habitually and regularly manufactured and sold to the public under such distinctive name; although, of course, if it were attempted to add to an article of food thus sold under its distinctive name another ingredient which it had not regularly and habitually contained under the distinctive name under which it had been sold to the public, and such added ingredient were poisonous or deleterious, it would thereby become subject to condemnation under the provisions of the Act.

To hold otherwise would, in my opinion, render the word "added" as repeatedly used in the Act in connection with poisonous and deleterious ingredients, entirely meaningless, and would involve an irreconcilable contradiction in the clauses of the Act in which it is expressly provided that a mixture or compound known as an article of food under its own distinctive name, not an imitation of or offered for sale under the distinctive name of another article of food, and not containing any "added" poisonous or deleterious ingredient shall not be deemed to be adulterated. The conclusion is, to my mind, unavoidable, that by the use of this language Congress intended to provide that a compound article of food thus known, labeled and sold under its own distinctive name, should be assimilated to a natural product and not be deemed to be adulterated, whatever the character of its ingredients, if it contained no in-

gredients other than those habitually and regularly entering into it as constituents under the form and with the characteristics with which it had acquired its distinctive name and become known to the public. In this case, as in the case of a natural food product, if the article is sold under the same distinctive name with the same constituents and with the addition of no other ingredients whatever, the public in purchasing the article is not deceived—as it would be if an essential constituent ingredient were left out—but on the contrary, obtains exactly the article which it has been accustomed to buy under this distinctive name, and which possesses exactly the qualities and produces exactly the effect which renders it in the mind of the public a desirable article of consumption, without addition, change or adulteration. And while it is true that a purchaser of Coca-Cola, for example, may not know either that it contains caffeine at all or the actual quantity of caffeine that it contains, the same thing may be true of the purchaser of coffee, or of other natural foods containing poisonous or deleterious ingredients. However, in the one case, as in the other, the purchaser obtains the article which he desires in its entire make-up and composition, without addition or subtraction, and without the addition of any deleterious ingredient with whose effect he is unaccustomed, and which he does not desire. In short, in the one case, as in the other, the public obtains without deception exactly the article which it wishes to buy, producing the effect which it desires; and in the one case as well as in the other, I think the article cannot be properly said to be adulterated within the meaning of the Food and Drugs Act, and the plainly expressed intention of Congress on this subject.

To hold otherwise, in my opinion, would be beyond the province of the Court and an attempt to reach by judicial construction a supposed evil in the composition of articles of food sold under their distinctive names, which, if a remedy be required, can only properly be obtained by legislation. It is well settled that the function of the court in the enforcement of a statute is limited to the ascertainment of the legislative intent as expressed in the Act, and cannot extend to either legislation or amendment, and that consideration of apparent hardship will not justify a strained interpretation of the law as it is written. The question, therefore, as to whether the Act as drawn is lacking in essential provisions for the protection of the public health in failing to provide that other articles of food as well as confectionery shall be deemed adulterated if they contain any ingredient deleterious or detrimental to health is clearly a legislative question which it is not within the province of the Court to determine.

Applying the Act as thus construed to the undisputed facts in evidence, I find the facts established, without any contradictory evi-

dence, to be that the name "Coca-Cola" is a trade name which has for many years been given by the manufacturer to the food product in question, and upon which name a copyright was many years ago obtained; that this food product is an artificial compound used in the preparation of beverages consisting of a sweet syrup colored with caramel, with some phosphoric acid, lemon juice and other minor ingredients, with perhaps some ingredients or qualities derived from the coca leaves and cola nuts which are used to a certain extent in its preparation after being subjected to a process by which the cocaine and certain other ingredients are extracted and also containing as an essential ingredient of the compound caffeine obtained in the main by chemical extraction from tea; that this compound has been for many years manufactured under a formula prescribing certain definite proportions of such caffeine as one of its essential ingredients; that for many years as so manufactured and sold it has regularly and habitually contained the same approximate amount of caffeine, being about one and one-fifth grains to each fluid ounce of the syrup, although slightly less caffeine is contained in the syrup prepared for use in bottles than in that prepared for use at soda fountains and although the percentage of caffeine in each individual container may vary slightly owing to process of manufacture employed, the average caffeine content being, however, substantially as above stated; that for many years this compound, containing such caffeine, has been sold under this trade-mark name of "Coca-Cola," has been extensively advertised under this name, and has under this name become generally known to the trade and to consumers in the United States; that no other article of food or beverage has been either manufactured or sold under the name of Coca-Cola, that it imitates no other article and is not sold under the distinctive name of any other article, and that this name distinguishes this particular product from all other beverages and articles, and clearly identifies it as a particular kind and brand of beverage made by its manufacturer and sold under this name, and distinguishes it from all other beverages or food products manufactured and sold by other persons.

I therefore find, as a conclusion of law, from these facts, that the name "Coca-Cola", is and was at the time this libel was filed, a distinctive name which clearly distinguishes this particular compound from any other food product, and I further find from the undisputed facts in evidence that the "Coca-Cola" sought to be condemned in this case is and was when the libel was filed, a compound known as an article of food under its own distinctive name; that it is and was not an imitation of or offered for sale under the distinctive name of any other article; that the name on the label is and was accompanied with a statement of the places where the article was manufactured; and that the caffeine which it contained is and was not an "added

ingredient" within the meaning of the Food and Drugs Act but is and was a usual and normal constituent of the article that had been and was known to the public under the distinctive name of "Coca-Cola." And I therefore conclude that as a matter of law the Coca-Cola in question is not to be deemed as adulterated by the presence of caffeine as an "added" ingredient within the true intent and meaning of the Act.

The conclusion thus reached is strengthened by a consideration of the pleadings in this case. In the libel it is alleged that the food product "Coca-Cola" which it was sought to condemn is adulterated in that it contained an "added ingredient" caffeine, which was and is both poisonous and deleterious, yet the entire proof unquestionably shows that the caffeine contained in the article Coca-Cola is one of its regular, habitual and essential constituents, and that without its presence, that is, if it were de-caffeinated, so to speak, the product would lack one of its essential elements and fail to produce upon the consumers a characteristic if not the most characteristic effect which is obtained from its use. In short Coca-Cola without caffeine would not be "Coca-Cola" as it is known to the public and would not produce the effect which the Coca-Cola bought by the public under that name produces, and if it were sold as "Coca-Cola" without containing caffeine the public buying it under this name would be in fact deceived.

The Government's contention then, under the proof, leads to this—there being, it is to be observed, no issue raised in the pleadings as to the amount of caffeine contained—that an entire compound containing a certain ingredient, which is one of its essential ingredients, and without which the compound would lose its characteristic qualities, is, as an entire compound, to be deemed adulterated because it contains such ingredient, on the theory that such ingredient is added to the compound, as distinguished from being contained in it as an essential constituent of the entire compound. It is difficult to see, however, how any part which is an essential of an entire article, and without which the entire article would not exist, can be properly deemed to be added to the entire article, or, in short, to be added to or adulterate itself.

The case would be different, of course, if the libel alleged that any other constituent of the compound, as for example the syrup, was sold as syrup, and in fact adulterated with caffeine. That, however, is not the case. The libel specifically alleges that the food product "Coca-Cola" is adulterated by the addition of caffeine, and the proof unquestionably shows that the caffeine is not an addition to this compound, but is one of its essential and normal ingredients under the distinctive name under which it has been sold and is known to the public.

It results that in so far as the libel charges that Coca-Cola is adulterated because it contains caffeine as an added ingredient, the claimant's motion for peremptory instructions must be sustained.

2. It is also alleged in the libel that the name "Coca-Cola" as used on the label, suggests and represents the presence in this food product of coca, meaning the leaves of the coca plant, and that this product does not in fact contain any coca in its composition, thereby constituting a false and misleading statement regarding the ingredients and substances contained in the "Coca-Cola."

Assuming, for the purpose of determining this motion that there may be a disputed question of fact as to whether the use of the word "coca" in the name contained upon the label is to be regarded intrinsically and originally as a statement of suggestion of the presence in the product of the leaves of the coca plant or of some material element or quality derived therefrom, and further assuming that there may be a conflict in the evidence as to whether or not there is contained in "Coca-Cola" any portion of the leaves of the cola plant or any substance or quality derived therefrom to any material degree, the preliminary question arises as to whether, upon the other undisputed facts in evidence these issues of fact shall be submitted to the jury for their determination, as questions of fact, or whether under the other undisputed evidence in the case, these allegations, if true, are, as a matter of law, immaterial.

Without stating my reasons in detail it is sufficient at this time to say that after careful consideration of the question I have, for reasons directly analogous to those which determined my conclusions in reference to the adulteration of an article sold under the distinctive name, concluded that it was the intention of Congress to provide that where a compound article of food was known under its own distinctive name, was not an imitation of any other article of food or sold under the distinctive name of any other article, was properly labeled as to the place of manufacture, and contained no "added" poisonous or deleterious ingredient, it should not be deemed misbranded within the meaning of the Food & Drugs Act in so far as any statement of suggestion contained in the name itself is concerned. To hold otherwise would in my opinion, involve an absolute and irreconcilable contradiction between the several clauses in section 8 of the Act and would render meaningless the express provision of that section that a compound known as an article of food under its own distinctive name, not an imitation of or offered for sale under the distinctive name of another article, properly labeled with the place of manufacture, and not containing any added poisonous or deleterious ingredients, shall not be deemed to be misbranded. Obviously if the article contains the same constituents as those normally and regularly contained under the distinctive name under which it is sold and

under which it is known to the public, the distinctive name indicating this distinctive article, is not misleading, but on the contrary serves to directly inform the public that it is the specific article which the public knows under that name and desires to buy.

It results from the facts hereinbefore found from the undisputed evidence that in so far as the libel charges the misbranding of the Coca-Cola by reason of any false statement of suggestion contained in the name itself, the claimant's motion for peremptory instructions must be sustained.

3. It also results from what has been heretofore stated that in so far as the libel charges that the Coca-Cola is misbranded because of being an imitation of or offered for sale under the distinctive name of another article, in the entire absence of evidence to show that this is the case, the claimant's motion for peremptory instructions in so far as this charge of the libel is concerned, must also be sustained.

4. With reference to the charge that the Coca-Cola was misbranded by reason of being mixed, colored or stained by the use of coloring substance whereby damage or inferiority of the mixture was concealed, without expressing any opinion upon the weight of the evidence, I am of the opinion that the evidence is not so undisputed as to constitute the solution of this question a mere matter of law, but that this question should be left to the jury under the issues raised by the pleadings.

So far, therefore, as this charge in the libel is concerned, claimant's motion must be overruled.

5. As to the charge in the libel that the pictorial design of coca leaves on the labels is misleading in that it represents and suggests the presence of the substance coca in the "Coca-Cola" product I have had great difficulty. While it is apparently true that under the provision of the Act heretofore quoted that no compound food product sold under its own distinctive name shall be deemed to be misbranded, when it contains no added poisonous or deleterious ingredient and is otherwise sold and labeled in accordance with the Act, it would apparently follow as a matter of the strict letter of the law that in the absence of any added poisonous or deleterious ingredient, a product thus sold under its distinctive name cannot be deemed misbranded upon any ground. I have concluded, however, that giving a fair and reasonable construction to the somewhat conflicting provisions of the Act, it was only intended to protect an article sold under its distinctive name from the charge of misbranding in so far as any statement or suggestion contained in the name itself is concerned, and that it was not intended to prevent the condemnation of the article as misbranded even though sold under its own distinctive name if in addition to such distinctive name the

label contains other misleading statements, designs or devices. Without expressing any opinion as to whether the pictorial design on the label in question is misleading in any particular as to the presence of coca leaves or any ingredient or quality derived therefrom, I am of the opinion that under the evidence in the case this is not purely a question of law, but is a question of fact which, under all the evidence should be submitted to the jury for its determination. Therefore in so far as the charge of misbranding based upon the pictorial design of coca leaves upon the label is concerned, the claimant's motion for peremptory instructions will be overruled.

To the extent hereinabove stated the claimant's motion for peremptory instructions is accordingly sustained; otherwise it is overruled.

Thereupon counsel for libellant stated to the court that it was desired by the Government to test, as speedily as possible, the question as to whether the Coca Cola which it seeks to condemn is adulterated in that it contains "an added ingredient, caffenin," which is alleged to be a poisonous and deleterious ingredient that may render such food product injurious to health, and to facilitate an appeal, and therefore moved the court to dismiss, without prejudice, as to the matters involved in paragraphs numbered 4 and 5 of the above opinion, which motion was allowed. The court then proceeded to instruct the jury as follows:

THE COURT: Gentlemen of the jury, in pursuance of my action on the claimant's motion for peremptory instructions, and in consequence of the dismissal by the Government in open Court and in your presence of the two questions of disputed facts in the case, which I think ought to be submitted to you for your consideration, and in consequence of the fact that upon the other questions in the case upon the undisputed evidence in my opinion the Government is not entitled to a verdict at your hands, and in consequence of my action in sustaining the motion for a peremptory instruction as to such other grounds, I now direct you to return a verdict in favor of the Claimant, the Coca-Cola Company. You may return that without leaving your seats.

Upon rendition of verdict in favor of claimant, libellant filed a petition and motion for new trial, which was overruled, whereupon notice was given of both appeal from said judgment and writ of error, to the Circuit Court of Appeals for the Sixth Circuit.

At the trial, libellant and claimant, respectively, introduced the following witnesses, who testified in substance as follows:

W. J. DOBBS, a witness for the libellant, testified:

I reside in Chattanooga, Tenn., and am engaged in the wholesale grocery business. In September and October, 1909, I was a member of the firm of Trigg, Dobbs & Co. We received shipments of Coca Cola syrup in kegs and

bottles from the Coca Cola Co., Atlanta, Ga., and distributed it to retail dealers in Chattanooga, Tenn. In response to an order given by Trigg, Dobbs & Co., said company on Oct. 21 or Oct. 26, 1909, received at Chattanooga, Tenn., from the Coca Cola Company, Atlanta, Ga., 20 barrels and 20 kegs of Coca Cola syrup. This lot of Coca Cola was shipped in a car to the Coca Cola Bottling Works of Chattanooga, and was delivered to our trade by them, so that we got part of the car and they got part of it. The 20 barrels and 20 kegs of the product received by us were in original unbroken packages, and the consignment was involved and shipped to us by the Coca Cola Co., Atlanta, Ga. An United States inspector came to our place of business on the 21st or 22nd of October, 1909, and procured samples of Coca Cola from this particular shipment. He put the samples in gallon jugs and carried them away with him. This lot of Coca Cola was shipped to us for sale.

J. L. LYNCH, a witness for the libellant, testified:

I am a Food and Drug Inspector of the United States Department of Agriculture. I visited the factory of the Coca Cola Co. in Atlanta, Ga., on July 19, 1909, and went through the building from bottom to top. The factory building consists of a basement and two stories. It is a triangular-shaped building, surrounded by Edgewood Avenue and Coca Cola Place, and has a yard in the rear. I was conducted through the factory by Mr. Howard Candler, who was acting in the capacity of manager of the factory. Mr. Candler showed me the arrangements for making Coca Cola. I commenced my inspection on the first floor, which is a few feet higher than the street. The Coca Cola syrup was being manufactured on this floor in a large metal kettle. The ingredients which go into the syrup are sugar, coloring, and water. The water is carried into the kettle through pipes connected with the city water mains. Flush with this kettle was a wooden platform, and several barrels of sugar were stored on that platform. There was a colored man engaged in making the syrup, Mr. Candler called him the cook. The sugar was put in the kettle by knocking the heads out of the barrels and dumping their contents over the platform. The caramel for coloring was kept in a barrel by the side of the kettle, and was put into the syrup by pouring into a metal measure and dumped into the kettle. The syrup is cooked by steam, applied by means of a steam jacket. The negro cook engaged in dumping the ingredients into the kettle was scantily attired in a dirty undershirt, old dirty trousers, and broken shoes. His bare feet were protruding through his shoes in places, and he was perspiring freely. He was chewing tobacco, and spitting from time to time, the expectorate falling on the floor and on the platform from which he was dumping the sugar. In dumping the sugar a considerable amount of it fell on the platform, this the cook pushed into the kettle with his feet and with a board. The platform looked as if it had never been washed; the sugar had been ground into it by walking on it. The kettle appeared as if it had not been thoroughly washed or scraped for some time; there was crystallized sugar or syrup all over the edges and in the joinings, the outlet, and along the different pipes about it.

There was a water-closet on this floor, of the ordinary flush-ball type, opening into the room in which the syrup was made. The door swung into this room and the closet ventilated into it.

The cooling tanks and cooperage room were in the basement. The syrup made in the kettle I have just described was conveyed to the tanks in the basement by means of pipes. There were ten cooling tanks suspended from the basement ceiling, some of them near the windows which opened on Edgewood Avenue and on Coca Cola Place. The windows were opened during the cooling process. The top of the basement consisted of only the floor of the first



story and stringers; there was no ceiling or plastering. There was nothing to prevent dust or dirt seeping through the floor or falling from it, dropping into the cooling kettles. Cobwebs and spiderwebs were suspended very generally around the cooling tanks in the basement. There was a mixing tank in the basement, and the essential oils used in Coca Cola, what is known as Merchandise No. 5, and phosphoric acid, lime juice, etc., were conveyed to the mixing tank from a laboratory on the first floor by means of funnel-shaped arrangements. The caffeine was in two different cans or containers; one was a large tin can, holding about 50 pounds. The caffeine was put into the syrup after being mixed with or dissolved in water. Commercial alcohol is also put in with these different oils or flavors enough to cut the flavor. That goes through the funnel into the mixing tank. There were 25 pounds of caffeine to 1,200 gallons of syrup. There was a toilet in the basement of the same type as the one above, and it ventilated into the basement. The concrete floor of the basement was very dirty and littered up, and had evidently never been scrubbed. The floor was badly worn and had holes in it and water would remain in these holes and not drain off. The help in the factory consisted of three whites and eight negroes. The negroes used tobacco and spit it over the floor. They were dressed in trousers and undershirt and were perspiring. The stairs leading down from the first floor into the basement were covered with several inches of dirt, so that I was afraid of slipping down there. They had never been washed, cleaned, or scrubbed. I went to the factory in Atlanta and saw Coca Cola syrup, which was afterwards seized by the Government, loaded into a car, and took samples of the product after it had been shipped to Chattanooga. I sealed the samples and forwarded them by express to the Bureau of Chemistry, Washington, D. C. I did not see the caffeine or other ingredients put into the syrup while inspecting the factory, except the sugar and caramel.

The finished product is the color of caramel, a brownish red. After the color is added to the syrup one can not easily detect foreign substances in the mixture, such as grass or straw, or any foreign article. The finished product is stored and shipped in old whiskey barrels.

H. C. FULLER, called by the libellant, testified as follows:

I am a chemist, a graduate of the Worcester Polytechnic Institute, Worcester, Mass., and have had ten years' practical experience as a chemist after leaving that institution. I have been connected with the Bureau of Chemistry in Washington for the past four years. Prior to that time and after leaving the Worcester Polytechnic Institute I was connected with the Mallinkrodt Chemical Works, New York City, and Parke, Davis & Co., of Detroit, Mich. I am now and was at the time of making an analysis of a sample of the Coca Cola syrup seized by the Government in October, 1909, an assistant chemist in the Bureau of Chemistry, U. S. Department of Agriculture. I received the samples in this case—I. S. Nos. 3966-B, 3967-B, and 3968-B—from Inspector Lynch with the seals intact. I analyzed said samples and found them to contain caffeine in the following proportions: No. 3966-B, 0.92 grains per ounce; No. 3967-B, 1.02 grains per ounce; and No. 3968-B, 1.19 grains per ounce. I also received from the same source a keg of Coca Cola syrup marked I. S. No. 3980, which keg I placed on end and allowed to stand untouched for three months. Then I bored a hole in the side of the keg about four inches from the bottom and allowed the syrup to run off down to a level with the hole. I then knocked the top out of the keg and filtered what was left there through a piece of filter paper, then washed the filter paper with water. I found in the filter paper some undissolved material, a little straw and material of a similar nature which looked like hay, a part of a bumblebee, some legs of insects, and

other extraneous matter, which was apparently dust or dirt. This Coca Cola syrup is a very thick mixture, and being of such a nature it would tend to hold up the lighter dust and particles, which probably never would settle. I found on analysis that the mixture called Coca Cola syrup consisted of the following ingredients: Caffeine, phosphoric acid, sugar, water, glycerine, caramel coloring, lime juice, essential oils, and a trace of alcohol. I was assisted in making my experiments by Dr. W. O. Emery. I analyzed a sample of a substance used as "Merchandise No. 5," which is used in making Coca Cola syrup, and found it to be a liquid preparation containing 16.1 per cent of alcohol and 4.12 per cent of nonvolatile material. It had the odor of toluol, a coal-tar product, and contained a little more than 1 per cent caffeine. I prepared mixtures of water, caffeine, and merchandise No. 5, also mixtures of water and caffeine, and delivered them, together with some genuine unaltered "Merchandise No. 5," to Dr. F. P. Morgan for him to experiment with. I used in these mixtures 1 grain of caffeine to the ounce. The words "Coca" and "Cola" mean, respectively, coca leaves and cola nuts, and are so understood by the drug trade. The pictorial design on the barrel containing the Coca Cola resembles coca leaves and cola nuts. I could not find any coca or cola products in the samples of Coca Cola analyzed by me.

W. O. EMERY, called by the libellant, testified as follows:

I reside in Washington, D. C.; am a chemist by profession; a graduate of the Worcester Polytechnic, and have also been a student and instructor at Bonn University, in Germany; I have spent five years subsequently in Germany at different periods for research, and was professor of chemistry at Wabash College about six years; I have been nearly four years in the Bureau of Chemistry, Washington, D. C.

I analyzed three samples of coca cola syrup taken from the consignment in controversy, and found them to contain caffeine. The percentages of caffeine were about sixteen, nineteen, and twenty-two hundredths per cent for samples I. S. Nos. 3966, 3967, and 3968. I account for the fact that I found more caffeine than Mr. Fuller by the facts that I used a different method, and probably exhausted or extracted longer.

HENRY H. RUSBY, called by the libellant, testified as follows:

I reside in Newark, N. J., and am professor of materia medica at the New York College of Pharmacy. I was educated professionally at the College of Physicians and Surgeons of New York and the medical department of New York University. I lectured for a number of years in the medical colleges of New York, and at the Bellevue Medical Hospital of New York on materia medica. I have been engaged in such work since 1889. I have been employed by the United States Department of Agriculture for the past four years, and in connection with such employment examine all the crude plant drugs that come to the port of New York. I have been a writer for the United States Pharmacopœia since 1890. As a lecturer it has been my duty to lecture on the subject of drugs, their names and synonyms, their origin, history, properties, and uses as drugs. I spent nearly a year in countries where coca is grown and among the people who use it, for the express purpose of studying that plant, and have written a pamphlet entitled "Coca at home and abroad." I have made analyses of the leaves of the shrub, the bark of the root and stem, the wood, and the flowers. Cocaine is the chief active principle of coca, and it is to get the effect of the cocaine that the natives of the countries in which it is grown chew it. It is known by the name "coca" in the countries where

grown, and that name has been introduced into our language to designate the leaf of the *Erythroxylon coca*. It is never known by any other name.

The term coca means coca leaves; the terms are synonymous, but the article is generally known to the trade by the name coca. The pictorial design on the Coca Cola keg represents coca leaves and the part of the cola plant improperly called cola nut. The terms cola and cola nut are used synonymously, but cola nut is improper, as the article is not a nut in any sense of the word. The pictorial design on the Coca Cola keg represents substances that are properly and generally known as coca and cola. The product called coca would not be coca if the cocaine were abstracted. Taking into consideration the results of the administration of caffeine it is my opinion that it is apt to be deleterious to human health. I can not say it is in every case, because it depends on how much is taken and on the peculiarity of the individual. Very often it has bad effects. If amounts varying from nine-tenths of a grain to one grain and a quarter of caffeine per ounce composing a mixture such as that described by Mr. Fuller to be the product known as Coca Cola were taken into the system in repeated doses it might be injurious to health. If used by young people or children it would be bad, no matter how little were taken; it should not be allowed at all. Guarana is a caffeine containing plant. It contains not less than  $3\frac{1}{2}\%$  caffeine, and is used by the natives of the countries in which it grows just as we use tea and coffee. I have lived among such people, and have noted that the excessive use of guarana causes paralysis or shaking palsy.

E. A. RUDDIMAN, called by the libellant, testified as follows:

I reside in Nashville, Tenn., and my chief occupation is professor of pharmacy at Vanderbilt University. I have been connected with the Vanderbilt University a little over 20 years, holding the chair of pharmacy and materia medica in the department of pharmacy, and part of the time lecturing on pharmacy in the medical department. I am a chemist and have been chemist for the Board of Pharmacy of the State of Tennessee since about 1897. For the past three or four years I have been employed as a chemist in the Bureau of Chemistry, U. S. Department of Agriculture.

Coca is the leaf of a plant generally bought, sold, and referred to by the name "Coca." It is not bought or sold under any other name. "Kola" is the term in general used to designate the kola nut, or more properly the seed. The chief active principal of coca is cocaine, and the chief active principal of kola is caffeine.

F. P. MORGAN, called by the libellant, testified as follows:

I am a physician by profession in the employ of the Department of Agriculture at Washington. I graduated from the College of Physicians and Surgeons of New York in 1893. I practiced medicine in Washington, D. C., until October 15, 1907, when I entered the Department of Agriculture.

I conducted experiments with rabbits during the year 1908, feeding them Coca Cola, Merchandise No. 5, and Merchandise No. 5 plus 1 grain of caffeine daily, carefully noting the effect of said substances. I also made similar experiments in 1910 and 1911. I used three rabbits for the experiments in 1908 with Merchandise No. 5, with one grain of caffeine added, continuing the experiment for 114 days on one rabbit. One rabbit died after 19 days, another after 60 days, and the third was killed after 114 days, making an average of 64.3 days that the rabbits lived. The weight of the rabbits was taken at the outset of the experiments, and it was noticed that they decreased in bodily weight under the treatment, although they received the usual amount of food,

air, and sunshine. Autopsies were performed on the dead rabbits and all three showed inflammation or congestion of the stomach or intestines, or both. That is to say, the alimentary tracts showed lesions in case of all three rabbits. I also conducted experiments on two rabbits during the year 1908, feeding them Coca Cola syrup. The weight of the rabbits declined, on the average, 19.7%. One of the rabbits lived and the other died. They had been fed daily  $\frac{2}{3}$  of an ounce of Coca Cola syrup mixed with one-third ounce of water. An autopsy was held which revealed signs of thickening and chronic inflammation in the stomach of one, and sub-acute inflammation in the other. I fed four other rabbits with Coca Cola syrup in 1908, giving them an ounce of the syrup with  $\frac{1}{3}$  of an ounce of water daily. The loss of bodily weight was, on the average 21.4%. One lived 8 days, one 18 days, one 38 days, and the other 75 days. My next experiment was in 1910; I used three sets of rabbits. To one set I fed  $\frac{1}{3}$  of an ounce of Coca Cola syrup and one ounce of water daily; to the second set I fed  $\frac{2}{3}$  of an ounce of Coca Cola syrup and one ounce of water daily; and to the third set I fed one ounce of Coca Cola syrup and one ounce of water daily. All my feedings of rabbits were in addition to their regular food. There was, generally speaking, a decrease in bodily weight. Of the first set four died, after living 33, 49, 97, and 61 days, respectively. Autopsies were held on all these rabbits, and five of them showed inflammation or congestion of the stomach or intestines, or both. The next set of experiments I commenced early in January, 1911, using seven rabbits. They were given  $\frac{2}{3}$  of an ounce of Coca Cola syrup with  $\frac{1}{3}$  of an ounce of water daily. Two of the rabbits died, and the remaining 5 were killed March 6, 1911. The average loss of bodily weight was 22.28%.

In the next set of experiments 3 rabbits were used. They were given each day  $\frac{2}{3}$  of an ounce of 1% solution of caffeine in water with  $\frac{1}{3}$  of an ounce of water. One rabbit lived 29 days, one 41 days, and the other 59 days after the experiment was begun. The loss of bodily weight in these rabbits was, on an average, 26.2%. Autopsies were conducted in the Bureau of Animal Industry in all cases. Animal experimentation is generally resorted to for the purpose of determining the effect of drugs on the human system, and in many cases it is the only way in which such effect can be determined. There are a number of instances in which death has been caused by caffeine. Zenetz reports 3 cases of death by caffeine. Leill has reported one case of caffeine poisoning; it is reported in Butler's Pharmacology. Muccioli's Toxicology, an Italian work, holds that caffeine is fatal to man, and gives the lethal dose as two to three grams. Our experiments have shown the lethal dose for rabbits to be about  $2\frac{1}{2}$  grams per pound of weight. Gautherin, in the Paris Thesis, 1905, reports two cases of death by caffeine. M. P. Lemaire reports one case of death by caffeine in the Journal of Medicine of Bordeaux, Vol. 39, page 294, May 9, 1909.

L. F. KEBLER, called by the libellant, testified as follows:

I am a chemist and physician by profession. I was educated at the University of Michigan, graduating from the literary department and school of pharmacy in that school. I took special courses in the Jefferson Medical College, at Philadelphia, Pa., and am a graduate from the School of Medicine, George Washington University, Washington, D. C. I taught chemistry at the University of Michigan. I am a registered practitioner of medicine in the District of Columbia, and for the past four years have been Chief of the Drug Division, U. S. Department of Agriculture.

I am familiar with the substance known as "cola." It is a crude drug of peculiar form, brownish in color, and is sometimes called cola nut. I am also acquainted with the substance known as "coca." It is a crude drug, a leaf

obtained chiefly from South America, but sometimes from the island of Java. Cocaine is the active principle of coca, and it is largely for the manufacture of cocaine that coca is imported into this country. It is also used for the manufacture of fluid extract of coca. I have traveled extensively over the United States and have observed that Coca Cola is sold indiscriminately to all comers at soda fountains, without distinction as to youth or old age, nervous or robust persons. I have seen children from four years up drinking Coca Cola at fountains. I visited the plant of the Coca Cola Co. at Atlanta, Ga., and observed the method of manufacturing Coca Cola. There was a steam-jacketed, copper kettle on the south side of the building, and between the kettle and the wall there was a platform. The top of the kettle was either level with or just below the surface of this platform, and the platform was used chiefly for the purpose of dumping sugar into the kettle. The mixture made in this kettle consisted of syrup, made from sugar and water, to which was added caramel or burnt sugar. This mixture was heated to the boiling point, then run off into a cooler, and from the cooler into vats strung just below the floor on which the operations were conducted. I observed caffeine there in tin cans, solid caffeine in the crystalline form in which it usually comes on the market. The basement of the factory where the vats were suspended was festooned with spider webs and flies in the webs, some of them overhanging the vats. The negro help in the plant was poorly clad, having on virtually nothing but undershirts, trousers, and shoes. They were perspiring freely. The steps leading from the basement to the main floor were very filthy and covered with sugar residue and dirt that accumulated in the factory several inches thick in places. On my second visit to the factory I noticed a drum of caffeine of slightly different appearance from the caffeine ordinarily met with in commerce. It was more compact, but not as white as the ordinary article. To the best of my recollection one of these drums would hold approximately 200 pounds, but the drum was not full.

I visited the plant of the Coca Cola Co. at Atlanta, Ga., on October 20, 1909, in company with Inspector J. L. Lynch. This was just before the seizure in this case was made. On this visit I took a sample of caffeine from one of the drums. On my three visits to the Coca Cola plant I noticed the help there, including the negroes, were chewing tobacco. I saw no cuspidors, but noticed the help spitting on the floor or the platform or any place they happened to be. The closets were ventilated into the building. The help were perspiring, and as they wiped the perspiration from their foreheads it fell on the floor or into whatever operation they were engaged. I saw the exhibit to Mr. Fuller's testimony—the substances remaining in the filtering paper after filtering the keg of Coca Cola seized in this case—and am of the opinion that the presence of such substances show the Coca Cola containing them to be an inferior and damaged product; also it is unwholesome, as it contains foreign and decomposed animal matter. The coloring matter added to the Coca Cola has a tendency to obscure from view the foreign substances in the syrup. Caffeine has a diuretic effect upon the kidneys and increases the force of the heart's action, but the chief effect is upon the brain, causing wakefulness, increased activity, etc. I have consumed Coca Cola, and find that if I take it late in the afternoon or in the evening it prevents sleep. I account for this effect by the action of the caffeine contained in the Coca Cola. I have watched for hours at soda fountains where Coca Cola is sold and have frequently heard it called for by the names "dope" and "coke." The amount of the syrup used in making a glass (eight ounces) of the beverage is from one to two and one-half ounces, an average of one and one-half ounces. Caffeine is a drug having a poisonous tendency. Numerous writers on toxicology, therapeutics, and pharmacology were cited to corroborate this view and to show that caffeine is recognized as a

poison. Witness defined a poison to be "any chemical which when introduced into the body or generated within the body produces death or disease or permanently or temporarily impairs an organ that is healthy or apparently healthy."

JOHN WITHERSPOON, called by the libellant, testified as follows:

I am a physician and surgeon by profession, a graduate of the medical department of the University of Pennsylvania, at Philadelphia, Pa. I am professor of practice of medicine in Vanderbilt University, at Nashville, Tenn., and have held that chair since 1895. I am president of the Medical Association of the State of Tennessee, and am on the council for medical education in the American Medical Association. I have been engaged in the practice of medicine for 24 years. I reside in Nashville, Tenn. I am acquainted with the substance known as caffeine, and have prescribed it medicinally. It is a heart stimulant. I think that one glass of Coca Cola, containing the amount of caffeine it is shown by Mr. Fuller's analysis to contain, would have very little effect more than as a mild stimulant, but it is the continued use that has the serious effect. It would affect the nervous system, making the user very nervous by its action upon the brain and spinal cord, overstimulating the reflexes; stimulating directly the centers. My experience with Coca Cola shows that continued users of it are seriously impaired in digestion. Young people soon form the habit of taking Coca Cola and take sometimes 8, 10, 15, or 20 drinks a day. Some become extremely nervous, weak, and the heart becomes rapid and irregular. They really look like morphine habitués, so far as their efforts to control it are concerned.

I have treated probably 30 or 40 patients afflicted with the Coca Cola habit during the last 4 or 5 years. I have had three cases in the hospital that I have treated to break off the habit. As they gave up the habit their health improved. I have thought that the habitual use of Coca Cola impaired their digestion. I regard Coca Cola as habit forming; one glass creates a demand for another because it stimulates the user and makes him feel better; then, when its effect wears off, the reaction is one of depression, and he gets very nervous and seemingly can not do without it very well.

T. J. SEARCY, called by the libellant, testified as follows:

I reside at Tuscaloosa, Ala., am a physician by profession, and graduated from the medical department of the University of the City of New York in 1867. I engaged in the active practice of medicine until 1892, when I was appointed superintendent of the Alabama Insane Hospital. As superintendent of the State Hospital for the Insane it is part of my business to inquire into the history of the inmates and note the causes of their disorders. The number of inmates is rapidly increasing. During the census reports of the census closed in 1910, the State population increased only about 16 per cent, while the admissions to the insane asylums of the State increased about 45 per cent during the same period. The admissions of drug and drink habitués have increased during that period. In my opinion caffeine is, in a sense, a habit-forming drug. It acts upon the nervous system and renders a man so he feels, or is able to feel, more comfortable. When he does not have it he feels worse, and he knows he can get some more and relieve it, making him feel better. The habit consists in the fact that the user knows he can take more to relieve him.

Dr. L. F. KEBLER, recalled to the witness stand, testified as follows:

I consider caffeine a habit-forming drug. Based on Mr. Fuller's statement as to composition, given on the witness stand, I know of no other habit-forming

ingredient or substance in Coca Cola except caffeine. From my own analyses of Coca Cola, sugar, water, caramel, caffeine, and flavoring agents are the only ingredients I have detected. I base my opinion that caffeine is habit forming on my own general observations of people in the habit of taking caffeine. It has been my experience that the use of caffeine containing substances induces habit. Habit forming, as I construe it, is a condition that is brought about in the system by the use of a chemical which, after continuing it a period of time, will leave such an impression upon the individual that when the chemical is withdrawn the system feels the need of it.

LOUIS LE ROY, called by the libellant, testified as follows:

I reside in Memphis, Tenn., am a physician by profession; a graduate from the Medical Chirurgical College in Philadelphia, Pa.; and have been practicing medicine since 1896. I am vice president of the State Board of Health of Tennessee, and at present hold the chair of practice in the University of Memphis. I was State bacteriologist of Tennessee for 8 or 10 years. I have had experience with Coca Cola and have consumed some of it myself. My first experience with it was 10 or 15 years ago. It was summer time and I drank half a dozen or so bottles of Coca Cola a day, but soon I found that I would have to leave it alone, because I got so nervous that my hand trembled and I could not do fine work. I attributed the nervousness to the Coca Cola I was drinking. When I quit using Coca Cola I straightened out in a day or two. I have had occasion to treat patients who were users of Coca Cola and found, as a rule, they were nervous and irascible. When they gave up Coca Cola their nervous condition generally improved. I can not take Coca Cola at night; it keeps me awake. I took a bottle of it a year or two ago when I was convalescing from typhoid fever and it kept me awake 48 hours or more. Coca Cola has a tendency to be habit-forming, its habit-forming propensities being most marked in neurotic, nervous, patients, and nervous women, who are not nearly so capable of resisting the habit or ravages of the habit-forming drugs as persons who are robust. The effect upon the human system of taking caffeine is that it enables the body to utilize more energy than it would otherwise utilize. A man can put forth more effort and sustain it a little longer under the action of caffeine than he could without it, but that excessive work is at the expense of his reserve energy. I have studied bacteriology and have been city bacteriologist in Nashville, Tenn. It is my opinion that a substance prepared under the conditions surrounding the preparation of Coca Cola (as described by Mr. Lynch and Doctor Kebler) would be practically certain to contain some germs. If a bee and other forms of animal life were found in the mixture, such as has been described, I think it would render the product inferior in character.

GEORGE R. STEWART, called by the libellant, testified as follows:

I reside in Cleveland, Tenn., and have lived there about 25 years. I am engaged in the ministry and on the lecture platform; and have been so engaged for 34 years. I have traveled extensively, practically covering the United States once a year. I lecture in the evening usually, and after my lecture, usually about 10 or 10.30 p. m., I go to a drug store for a lemonade. I have observed in the drug stores a very abundant sale of Coca Cola at the hours stated. I have frequently observed children ordering and drinking Coca Cola.

Counsel for libellant read the deposition of HUGO DuBois, who testified as follows:

I am a resident of New York City and secretary of the Roessler & Hasslacher Chemical Co., which company acts as selling agents for the Schaefer Alkaloid Works. As such agents the Roessler & Hasslacher Chemical Co. has contracts with the Coca Cola Co. to furnish them with merchandise No. 5 and caffeine.

Counsel for the libellant then read the deposition of EDWIN H. CORRY, who testified as follows:

I am a resident of Philadelphia, Pa., and am 37 years of age. I have been accustomed to drinking Coca Cola. I first began to use it in 1896 or 1897. I drank it occasionally up to 1904, at which time I commenced to use it daily in increasing amounts up to July, 1910, when I ceased to use it. It had a refreshing effect, somewhat stimulating or invigorating, and when I felt tired and fagged a glass or two of Coca Cola would revive me. As the habit increased I consumed about a dozen drinks a day. I finally became nervous, kept awake at night and experienced peculiar sensations. After I quit using Coca Cola my general condition improved, and has continued to improve.

As a result of my use of Coca Cola, or as a result of my impaired health, I was taken to the Philadelphia General Hospital, where I was examined and my condition inquired into by Dr. Theodore Weisenburg.

WILLIAM F. Boos, called by the libellant, testified as follows:

I am a physician with a consulting practice in internal medicine, and am chemist and pharmacologist at the Massachusetts General Hospital in Boston. I took the degree of A. B. at Harvard University in 1894, and studied at the University of Heidelberg, in Germany, taking the degree of Ph. D. in chemistry there. After my return to America I was for one year assistant in the department of chemistry at Harvard University. The next year I entered the Harvard Medical School, and in 1901 took the degree of M. D. in that school. Right after graduation I went to Germany and studied pharmacology for two years at the University of Strassburg. The next two years I was assistant to the head of the institution, Professor Schmiedeberg, at the University of Strassburg. I was called back to Massachusetts to undertake research for the Massachusetts State Board of Health on the question of the cold storage of poultry in 1906. I have had occasion to experiment with Coca Cola syrup as to its effect on animal life, using frogs for the purpose of experimentation. The effect of caffeine on human beings is very similar to its effect upon frogs. There is a slowing of the heart, a more pronounced systolic action. The caffeine also acts on the spinal cord of the human being, producing an increased irritability, an increased reflex irritability, so that little insults, as we call them, occurring ordinarily, become magnified. It also has an effect upon the centers of the brain, stimulating those centers to increased activity, the effect of which is deleterious to health, as the stimulation is carried out at the expense of the organism. The effect of caffeine on the consumer is at times to produce sugar in the urine or the viscera, which is decidedly deleterious to the organs. It also taxes or increases the tax that is made on the system to eliminate that poison from the system. It is decidedly deleterious, and weakens the resistance of the organs toward disease. The effects are worse upon very nervous people, and as for children, they should never be given drugs of any kind. The administration of Coca Cola syrup, containing the constituents stated by Mr. Fuller on the witness stand, would be harmful and deleterious to human health.



Caffeine is a drug which is frequently used as a stimulant in heart diseases. It has a stimulating effect upon the brain, and enables one to do increased mental work, but the work is done at the expense of the reserve energy of the individual, and is detrimental to health. A substance such as Coca Cola taken 1 oz. in 6 to 8 ounces of carbonated water during all hours of the day would have a great tendency to disturb the digestive functions injuriously. Caffeine is not a food in any sense.

J. H. MUSSER, called by the libellant, testified as follows:

I reside in Philadelphia, Pa., and am a physician by profession. I am a graduate of the University of Pennsylvania and have been practicing medicine since 1877. I have been professor in the University of Pennsylvania for 12 years, and am at present professor of clinical medicine in that institution. I am connected with a number of hospitals in Philadelphia, including the hospital of the University of Pennsylvania and the Presbyterian Hospital. I am author of a number of works on medicine and therapeutics. I have had occasion to observe the effects of caffeine upon the human system, and have prescribed it in my practice as a stimulant to the renal functions. It is prescribed in order to increase the activity of the kidneys—to increase the amount of urine. It also acts as a stimulant to the brain and nerves. It affects the nervous system by causing an excitement resulting in headache, perhaps tremulousness, irritability of the nervous system and heart, and possibly causing palpitation. It acts locally on the stomach, causing irritation, bringing about increased secretion, causing excess of acid, and in other ways impairing the digestion.

I have seen a copy of Mr. Fuller's analysis of Coca Cola and consider that the frequent administration of such a substance to a human being in the amounts in which it is ordinarily used would seriously affect the health of the person taking it. The effect would be most serious on persons in poor health, those of unstable nervous system, children, or young people. I consider caffeine a habit-forming drug. This opinion is based upon the fact that once taken, or taken for a period of time, there is a desire or craving of the system to repeat the dose. Caffeine is not a food, because it does not build up the tissues, it does not give energy, and does not aid in the repair of the organism. I have been called on to treat persons afflicted with caffeine poisoning. When the caffeine was withdrawn from them their health improved. In my opinion the consumption of Coca Cola, assuming that it contains the ingredients shown by Mr. Fuller's analysis, would seriously affect the health of a normal individual, and, if continued, would produce various symptoms of chronic caffeine poisoning. In a person in depleted health or one suffering from nervous debility it would increase the irritability or excitability of the individual. Caffeine is an artificial stimulant, and the effect of artificial stimulation is harmful to human health.

O. T. OSBORNE, called by the libellant, testified as follows:

I am a physician and medical teacher by profession and have been connected with Yale Medical School since 1888 as clinical assistant, then as instructor in materia medica and pharmacology. Since 1892 I have been professor of materia medica and therapeutics and for the last five years professor of clinical medicine. I have been practicing medicine in addition to my teaching ever since graduation. I am acquainted with caffeine. It is a drug of poisonous tendencies. Its continued or repeated use in the quantities shown by Mr. Fuller's analysis to be contained in Coca Cola would be harmful to human health. Its harmful results would be much more marked in a nervous

person or a child than in a robust adult. The child's digestion would be impaired; his nervous excitability would be increased; his nutrition and growth would be impaired; his mentality interfered with; he might and often does become a neurasthenic. A simple dose of a mixture such as Coca Cola will produce deleterious effects in a child or nervous person. I have seen such effects, not with Coca Cola, but with caffeine administered in another form. I have had to treat a good many persons who were suffering with caffeine poisoning. I consider caffeine a poisonous and habit-forming drug.

S. S. COHEN, called by the libellant, testified as follows:

I reside in Philadelphia, Pa., and am a physician by profession. I have been practicing medicine since 1883, and am a graduate of the Jefferson Medical College. I am now professor of clinical medicine at the Jefferson Medical College, attending physician at the hospital connected with the college, physician to the Philadelphia General Hospital, consulting physician to the Jewish Hospital, physician to the Rush Hospital for Consumption, and consulting physician to the Pennsylvania Hospital for the Insane. I am acquainted with the substance known as caffeine. It is a drug and a poison. Considering the amount of caffeine found by Mr. Fuller to be present in Coca Cola, I should say the harmful effects of Coca Cola would be those of caffeine in general. Its harmful effects would be more noticeable on young people, nervous people, invalids, and very old or feeble people than upon adults in early and middle life and who are perfectly healthy. It would also have greater harmful effects upon people of sedentary habits than upon those who do much outdoor work.

The harmful effects of caffeine may be summed up in this way: It is an excitant leading to overaction. This overaction is followed by fatigue and possibly by exhaustion, which leaves a person in a condition of irritability and weakness; that is to say, his energy has been used up in a bad way; the machine has been driven too hard and too long, and is left in a wabby condition, partially worn out, and liable to go off when it ought to be quiet. On a person accustomed to taking tea and coffee the use of Coca Cola in addition thereto would produce harmful results. I have observed cases of caffeine poisoning from tea, coffee, and guarana, but not from the alkaloid given in solution or swallowed as a powder. I consider caffeine a habit-forming drug.

M. V. TYRODE, called by the libellant, testified as follows:

I reside in Boston, Mass., and am a physician by profession. I have practiced 10 years as a physician, specializing on internal diseases. I have worked in pharmacology about 14 years, and was a teacher of pharmacology about 10 years. I am a graduate of the Harvard Medical College, at Boston, and taught pharmacology, materia medica, and therapeutics at that school. I am acquainted with the properties of the substance known as caffeine and its effect upon the human system. It acts first as a stimulant, then as a depressant on the central nervous system.

The ultimate results of the use of caffeine by human beings are deleterious to health, as the stimulation and giving off of reserve energy lead to exhaustion and fatigue. Caffeine is a muscle and nerve poison. Its effects are more marked in extreme of age—that is, in children and old people—than in middle-aged adults; more marked in females than in males; more marked in people who are neurasthenic, of nervous tendencies, or inherently nervous than in those who are normal; and more marked in persons of sedentary habits than those who do much outdoor work. I have experimented with caffeine on myself, taking 7 grains one morning and a like amount one evening. The effect

was similar in both cases. It produced a good deal of excitement and a choking sensation or pressure palpitation, restlessness, and complete sleeplessness; also confusion of thought and considerable mental anguish. Such effects result deleteriously to human health.

ROBERT J. FORMAD, called by the libellant, testified as follows:

I am employed as pathologist in the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C. I graduated from the University of Pennsylvania in veterinary medicine in 1888 and as a doctor of medicine in 1894. After my graduation from the University of Pennsylvania I was appointed demonstrator of histology in the veterinary department, and was assistant in histology in the medical department of said university. During the summer of 1892 I went abroad and studied, in Berlin and Stuttgart, Germany, pathology and sanitary science, as applied to animals. During the fall of that year I was appointed demonstrator of pathological histology and morbid anatomy in the veterinary department of the University of Pennsylvania, which positions I held for about 7 years. I was appointed assistant in pathology, Bureau of Animal Industry, in 1906, and still hold that position. During the years 1910 and 1911 I received certain rabbits from the Bureau of Chemistry and made a pathological examination of them. The animals had tags in their ears numbered 36, 37, 38, 39, 40, 42, 44, 45, 46, 47, 48, 49, and 50. Previous to that, in 1908, Dr. Morgan brought over two rabbits, which I examined in his presence and dictated the results of the post-mortem to him. I reported the conditions correctly as I found them. I retained a copy of the results of the post-mortem examinations made of the rabbits sent to me in 1910 and 1911. When I received the rabbits and examined them I did not know that they had been fed on anything out of the ordinary. The course pursued with regard to the rabbits bearing the numbers mentioned was to examine them at once, within an hour of the time they were received; if received alive they were chloroformed and the examination made within fifteen minutes after death. All of the rabbits except Nos. 47, 48 and 49 were emaciated, varying from slight emaciation to marked emaciation, which was shown by their external appearance. Inside the body I noted that the lesions which characterized most of the animals, and which were varying in degree of intensity, ranged from a fulness of the blood vessels in the organs in which are the chief seat of elimination, or carrying off of the waste products, the kidneys and the liver. In these two organs I found a distention of blood vessels varying to a degree of congestion. In the stomachs and in some of the intestines I found distinct fulness of the blood vessels, varying to a congestion.

In some cases there was a little increase in thickening of the lining of the stomach—what is known as induration. In the kidneys of all except Nos. 47, 48, and 49 (Note: The excepted numbers had been fed on simple syrup, without caffeine) there was marked irritation of the kidneys, varying from a fulness in the vessels to a congestion; and in the livers of all except Nos. 47, 48, and 49 there was a congestion, varying from slight to very marked. In some cases there were additional lesions, such as fatty conditions. I examined the brains and spinal cords of five of the rabbits and found the membrane coverings, the pia mater, showed a distinct fulness of the blood vessels. These vessels showed a marked distension under the microscope. The brains of rabbits numbered 47, 48, and 49 were practically normal, while the brains of the remaining rabbits were abnormal. I made no microscopical examination of the animals numbered 47, 48, and 49 because macroscopical examination showed that the lesions were not sufficiently pronounced to warrant it.

**B. A. GALLAGHER**, called by the libellant, testified as follows:

I am a veterinarian in the Bureau of Animal Industry, U. S. Department of Agriculture; I took a course in veterinary medicine at Cornell University, and graduated from that institution in 1901. I have been connected with the Bureau of Animal Industry since my graduation, with the exception of six months during which I served as assistant chief in animal industry in the Cuban Republic. In connection with my position in the Bureau of Animal Industry my work for about five years consisted in making post mortem examinations in the packing houses of the West. I have done pathological work and bacteriological work in the pathological laboratory at Washington. I made post-mortem examinations of six rabbits sent to the Bureau of Animal Industry from the Bureau of Chemistry; they had tags in their ears bearing the numbers 26, 27, 28, 29, 33, and 17. The animals were examined immediately upon their arrival, or within an hour afterward. I found congestion of the intestines of the rabbits examined. In some cases there was congestion of the stomach, liver, and kidneys, as well as the intestines. I did not know when I examined the rabbits on what they had been fed, and did not know what the Bureau of Chemistry was trying to determine.

**WORTH HALE**, called by the libellant, testified as follows:

I am a pharmacologist by profession, a graduate of the University of Michigan, where I took the degree of doctor of medicine in 1904 and the degree of A. B. in 1908. After graduating in medicine I had one year hospital work in Montana, and subsequently was connected with the University of Michigan for three years as assistant in pharmacology. I am now assistant in pharmacology in the U. S. Public Health and Marine-Hospital Service. I have had personal experience with caffeine, having on one occasion taken a dose of it and found that it caused confusion of thought and interfered with the process of coordination. I have made experiments on mice and guinea pigs, and more recently on frogs and a dog. Caffeine affects the muscles the same whether administered subcutaneously or by mouth. In my experimentation with frogs I used a solution of citrate of caffeine, one part to 50,000, which I injected into the lymph sacs. I have determined the minimum fatal dose of caffeine by experimenting on mice and guinea pigs, and am prepared to give an opinion as to the minimum fatal dose when administered to man, which would be the amount given in the Allard case, nine grains. As a rule lower forms of animal life are more resistant to caffeine than human life. I am of opinion that the use of a caffeine solution such as Coca Cola is described by Mr. Fuller would contribute to Bright's disease.

**WILLIAM SALANT**, called by the libellant, testified as follows:

I am a pharmacologist by profession. I graduated from Cornell University, Ithaca, N. Y., in 1894, with the degree of B. S. I then studied biology at Columbia University, New York City, for one year; then entered the medical department of Columbia University, and graduated with the degree of M. D. in 1899. For some time I had charge of the children's clinic at Mt. Sinai Hospital, New York City, and from 1901 to 1907 I held the position of Fellow of the Rockefeller Institute in New York City. During that time I taught physiology for one year in the Cornell Medical School, New York City, and from 1905 to 1907 I taught physiological chemistry at Columbia University. In 1907 I accepted a position as professor of physiological chemistry and pharmacology at the University of Alabama, and in 1908 I accepted a position as pharmacologist in the Bureau of Chemistry, U. S. Department of Agriculture,

which position I still hold. I have experimented with caffeine since January, 1909, continuing my experimentation up to about two or three weeks ago. I experimented on rabbits, guinea pigs, white mice, rats, pigeons, dogs, cats, and frogs, using no less than 600 animals. I made my experiments without any reference to the Coca Cola case whatsoever, the object was to get more accurate information on the drug caffeine. I find the fatal dose of caffeine when administered to a rabbit to be from  $2\frac{1}{4}$  to  $2\frac{3}{4}$  grains for every pound of rabbit, introduced by the mouth. Repeated doses of caffeine administered to animals, three-fourths grain per pound of animal given daily, produced impairment of appetite and loss of flesh and strength. Then from the ninth to the sixteenth day of the experiment death ensued. Quite a number died after one or two days of the treatment. Caffeine appears to have a cumulative effect, and its use produces nervousness, nervous irritability, and muscular tremor. I noticed that the effect of the caffeine was much less in well animals than those in a weak run down condition. In some of the rabbits I found that one-third of the minimum fatal dose produced death. One rabbit was given one-third of the minimum fatal dose and he had violent convulsions. One hour later he recovered from the convulsions and we found him dead the next day. He had pneumonia. From my experimentation I have reached the conclusion that caffeine is not a food. I kept a large number of rabbits without food for four or five days, and at the end of that period gave them two-thirds the minimum fatal dose of caffeine. It produced death in two or three hours. I also made experiments with dogs to determine the food value of caffeine, and am positive that caffeine has no food value whatever. Man is more sensitive to the effects of caffeine than the lower animals.

Mr. H. C. FULLER, recalled by the libellant, testified as follows:

I have examined many specimens of coca and have always found cocaine, allied alkaloids, and chlorophyll. In my analyses of Coca Cola I did not find chlorophyll and cocaine. The caffeine I found in the Coca Cola was not there in the form of extract of cola nut. I detected volatile matter in merchandise No. 5 resembling toluol in odor. It was impossible to tell from what source the caffeine present was derived, whether from cola nut, coffee bean, tea, or guarana.

WILLIAM SALANT, recalled by the libellant, testified as follows:

In my experiments on rabbits with caffeine I found that it would be excreted in the urine of the animal as free caffeine—the alkaloid. I also found it in the bile. As it must enter the circulation before it enters the urine it circulates all through the body, and comes in contact with the brain. As to the matter of circulation the anatomy of the rabbit is practically the same as that of man.

W. O. EMERY, recalled by the libellant, testified as follows:

I examined the bile on the animals referred to by Dr. Salant in his testimony and found caffeine present in its pure form. I also assisted him in experiments on beef livers, to determine whether caffeine is demethylated, neutralized, or destroyed by the liver ferments. In all cases the experiments showed that little or no caffeine was demethylated or destroyed, for the reason that most of the caffeine was recovered and identified as caffeine. We recovered 97 to 98 per cent of the caffeine used.

ALBERT P. MATTHEWS, called by the libellant, testified as follows:

I am professor of physiological chemistry in the University of Chicago. I was educated in the Massachusetts Institute of Technology. I studied two

years at the Columbia University in New York, two years in Cambridge, England, some time in Germany, and several months in Naples, Italy. I then returned to this country and spent another year studying at Columbia University, and there received my degree as Doctor of Philosophy. I then became assistant in physiology at the Harvard Medical School, Boston, Mass., and instructor in physiology at Tufts Medical School, also in Boston. I was afterwards instructor in physiology at the Harvard Medical School. I am acquainted with the physiological action of caffeine when administered by the mouth or by injection. The difference in effect is only one of degree. It takes a larger dose to produce an observable effect when given by mouth than when put under the skin. If caffeine were given by the mouth and afterwards excreted in the urine it would have passed through the brain, because the caffeine goes from the stomach into the intestines, from whence it is absorbed in the blood, and by the blood it is distributed throughout the body. In this manner it is carried to the brain and brought into contact with the muscles, causing stiffening and hardening of the muscles. On the spinal cord caffeine produces an effect practically identical with strychnine, differing from it only in degree. It increases the sensitiveness of the spinal cord or the impulses coming into it, so that an animal which has taken caffeine will go into a spasm if it is stimulated or touched. Its action upon the heart is to increase the force of the heart beat, and has about the same effect as digitalis, belonging to the same group of drugs so far as that action is concerned. The action of caffeine when injected into the blood stream is the same as when taken through the stomach in its effect on the muscles. It has been recovered from the muscle and the brain after having been injected into the blood stream. I think it could be so recovered if given through the stomach. In my opinion, caffeine is a poison and is not a food. Its use is detrimental to human health.

**J. W. McQUILLEN**, called by the libellant, testified as follows:

I reside in Chattanooga, Tenn., and am a physician by profession. I have had 27 years' experience in the practice of medicine. I am a graduate of the University of Dublin, Trinity College, Ireland; subsequently I studied about 8 months in Paris and about two years in Germany and Austria. I have made a special study of nervous diseases. I have observed in several cases the effects of Coca Cola on patients. Where it was taken in excessive quantities it produced nervousness, loss of power of the retentive faculties, sleeplessness, gastrointestinal disturbances, and irregularity of the heart. Caffeine is frequently prescribed as a drug in arhythmia, irregularity of the heart. As to the effects of the amount of caffeine contained in Coca Cola on human health I should say if a patient were in such condition that a dose of caffeine would be indicated in his case he might take Coca Cola, thereby prescribing caffeine for himself, and it might be of some benefit to him; but I think in most cases of nervous temperament it would be deleterious. I have had occasion to observe the sale and consumption of Coca Cola in Chattanooga during the year 1909 and noticed that it was served to children from 10 to 12 years old. Coca Cola makes me restless and nervous and prevents sleep if I take it in the evening. I am 53 years old and weigh 220 pounds. I consider it detrimental to health.

**J. F. SHEPHARD**, called by the libellant, testified as follows:

I am 62 years old, a physician by profession, and have lived in Chattanooga for 25 years. I had occasion during the fall of the year 1909 to visit frequently places where Coca Cola was dispensed and noticed that it was sold to and consumed by all classes of people, men, women, and children, mostly young

women, many of them shopgirls. I drank Coca Cola regularly 12 or 14 years ago and found that it gave me an irritable heart and caused sleeplessness. I take it only occasionally now.

S. R. BARNES, called by the libellant, testified as follows:

I live in Chattanooga, Tenn., and am a manufacturing chemist and pharmacist. I have lived in Chattanooga since April, 1908; previous to that date I lived in Stevenson, Ala., and Bridgeport, Ala. While in Bridgeport I had a drug store connected with my manufacturing business, and sold Coca Cola. I have observed the people who drank Coca Cola and its effect upon them. In one case especially I noticed a nervousness and neurasthenic condition. One of the effects was a seeming desire to continue the drink. On account of what I observed as to the effects of Coca Cola I discontinued its sale in my store. I observed that a great many boys drank it. I have seen them drink it from the bottles, and have noticed that it was the incorrigible boys of the neighborhood who drank it.

Dr. W. F. Boos, recalled by the libellant, testified as follows:

Assuming that caffeine is administered by the mouth and is afterwards found in the urine of the person to whom it is administered, it follows that the caffeine is in part absorbed from the stomach and in part from the intestines into the blood. When it is absorbed into the blood it will circulate throughout the body and reach all the tissues reached by the circulation, including, of course, the brain, the organs of digestion, the muscles, skin, and, in fact, every organ of the body. Accepting as correct the statement of Dr. Matthews as to the effect of caffeine on the muscle, heart, brain, and spinal cord, the administration of caffeine would have a deleterious or harmful effect upon human health. A great many persons suffer from heart disease, many of them without knowing they are so affected. Caffeine administered to such persons in the amount shown by Mr. Fuller's analysis to be contained in Coca Cola syrup would prove deleterious to the health of such persons.

R. T. WRIGHT, called by the libellant, testified as follows:

I live on Missionary Ridge, near Chattanooga, Tenn., and am an attorney at law. I am acquainted with the drink called Coca Cola. It is sold almost every where, in the city and out in the suburbs, in bottles and at the fountains and drug stores in the city. I have drunk as many as four or five drinks a day, but have quit using it. It stimulated me and caused nervousness and sleeplessness. I noticed its effect on my child, when he was 10 or 11 years old, was to keep him awake, and stopped him from drinking it.

W. J. DOBBS, recalled by the libellant, testified as follows:

The firm of Trigg, Dobbs & Co. purchased from the Coca Cola Co., of Atlanta, Ga., during the six months immediately preceding this seizure, for distribution to the soda fountains in the city of Chattanooga and vicinity, 7,276 gallons. We do not supply the bottling trade.

CHARLES A. CRAMPTON, called by the libellant in rebuttal, testified as follows:

I reside in Washington, D. C.; am by profession a chemist. I have been engaged in that profession for 28 years. In 1902, while connected with the Federal Government, I analyzed samples of Coca Cola syrup and detected the presence of cocaine. It also contained 1.6% caffeine.

JOHN S. CANDLER, called by claimant, testified:

I reside in Atlanta, Georgia; am a lawyer. The Coca Cola Company, a corporation, was organized in 1891, and the charter was granted about 1892. The company has been engaged, since its organization, in the manufacture and sale of a soda fountain syrup known as Coca Cola. Asa Candler, my brother, is president of the company, and has been since its organization. The formula for Coca Cola syrup was acquired by the company from Asa G. Candler. Dr. John S. Pemberton was the first man who ever had anything to do with the preparation. He called it Coca Cola syrup extract. The company changed the name to Coca Cola and registered it in the Patent Office.

This company has never sold or advertised the product under any other name than Coca Cola. It contained no cocaine at any time, as far as I know. I have drunk Coca Cola for twenty-five years. Sometimes I take a glass a day, and have drunk as much as a half dozen in a day. I can not say it has ever hurt me. My health has been good. I have never experienced any inordinate craving for it or observed any tendency to form a habit.

CHARLES HOWARD CANDLER, a witness for claimant, testified:

I am vice president and general manager of the Coca Cola Company, and have had charge of the manufacture of Coca Cola in the Atlanta factory since 1903. I have been connected with the company for thirteen years in several capacities. During all this time the product has been manufactured, sold on the market, and advertised under the name of Coca Cola. I was in charge of manufacturing the syrup at the time Dr. Kebler and Inspector Lynch visited the factory and at the time the product was seized in this case.

The manufacturing is done on the street floor of the building. On this floor is a kettle, 4½ feet high, and there is a platform about half way around it. The platform was of sufficient size to accommodate about twenty-five barrels of sugar. It took approximately that much to manufacture a completed tank of Coca Cola. It takes four meltings of the kettle to make one batch of Coca Cola. The sugar, about five barrels, is dumped into the kettle from the platform. As the sugar is dumped the water is run into the kettle from a storage tank which has previously received filtered water out of the city main. A sufficient quantity of water is brought into it to keep the sugar from burning when it comes in contact with the sides of the kettle. After the sugar is melted, the coloring—that is, caramel or burnt sugar—is put in. The caffeine is put in at the third or fourth melting so that the caffeine may come in contact with hot syrup; or, in other words, to fulfill the operation it takes four meltings to make a tank, and we put the caffeine in either the second or third melting so as to insure it being in a hot medium all the time, and to keep the caffeine and syrup at an even temperature. The contents of the tank are controlled by a gate valve and pipe line coming down in the floor and sustained from the ceiling by means of a hanger, and we have copper-lined, wooden cooling vats suspended by means of a cradle which is made up of large 8 x 8 or 8 x 10 stringers and sustained by lines going right up to the ceiling, holding the tank up. The pipe drops down into the tank. The finished syrup is left in the tank until it is cooled off.

In one corner of the laboratory, which is in another part of the building, there is a funnel attached to the pipe line which leads directly into the mixing tank, and when we are ready to mix this syrup in the mixing tank various flavoring extracts—glycerine, merchandise No. 5, and lime juice—are conveyed to the tank through this pipe. The phosphoric acid is poured directly through the manhole in the top of the tank to avoid corrosion of the pipe. The tank



is wood in its entirety. In the bottom of the kettle pipe we have a copper mesh strainer to catch the larger particles of wood, nails, and trash such as is found in all sugar. In the bottom of the tank we have a trap strainer made of fine copper mesh wire, and the goods are strained through it so that if the first strainer fails to catch such substances they may be caught in this strainer. We get the goods out of the mixing tank by means of a draft arm, like one of the soda fountains and which ends in a similar pipe. The barrel is set directly under this pipe on a rack. Where the pipe goes out there is another strainer finer than either of the two previous strainers to catch anything that may have passed possibly through these two strainers. All the funnels we use for directly filling the barrels are equipped with cheese-cloth covers, so that when the syrup hits the cheese cloth it acts as a strainer and keeps out any dust or dirt that might have gotten through the copper strainer from getting into the barrels. As the syrup comes from the first floor down to the basement it is a mixture of sugar, water, caramel, and caffeine, and when it comes to the mixing tank the other ingredients are put in.

About eight men, three white and five colored, are employed in making the Coca Cola. The sugar is dumped into the kettle by a negro, who has been employed since 1906. He does not chew tobacco. All these employees wear clothes and shoes in the factory different from those worn by them on the street. There is a water-closet on the first floor which opens into the room.

At the time of the seizure, in October, 1909, the melting kettle was covered with a piece of galvanized sheet iron. Half of the kettle is covered all of the time, and the other half was only opened when the ingredients were being put into the kettle. If any sugar fell on the platform it was scraped up with a steel scoop, made and used only for that purpose, and put in the kettle. The factory was ventilated in accordance with the building ordinances of the city of Atlanta.

I never analyzed Merchandise No. 5; it is now manufactured for us by the Schaeffer Alkaloid Works. In July, 1908. I saw coca leaves and cola nuts assembled there in proper quantities, according to Dr. Schaeffer's rule, and saw them undergoing certain processes.

Merchandise No. 5 is put into Coca Cola syrup just as it comes to us from the factory of Dr. Schaeffer. The caffeine is also put into the syrup in the condition in which we receive it without any change. The company has never advertised or sold Coca Cola under the name of "Dope" or "Coke."

The débris collected out of the keg and offered in evidence by the Government consisted largely of sawdust, and must have come from the kegs. Before putting the mixture into the kegs we steam them over a jet with a boiler pressure of 80 pounds. The only way that I can account for the sawdust being in the keg is that in manufacturing kegs the coopers use a drum saw which, in a large measure, chews the wood more than it cuts it, leaving particles of sawdust and small quantities of wood adherent to the sides. I am unable to see how the leg of a fly or piece of bee's wing got into the product. The kegs are thoroughly washed before being filled.

We furnish our customers with directions as to the proportion in which the Coca Cola syrup should be mixed with water, as follows: "Draw one oz. of Coca Cola in seven oz. glass, then fill glass with large stream of soda water, stirring with a spoon, that Coca Cola may be thoroughly mixed." These proportions make the best drink. In bottled Coca Cola the proportion is one oz. of syrup to seven oz.'s of water, and in the drink served at the soda fountains one ounce of syrup to six ounces of water. We use 15 gallons of Merchandise No. 5 to 1,250 gallons of the fountain product. The bottled syrup has 25 lbs. of

caffeine to 1,250 gallons, and the fountain syrup has 28 lbs. of caffeine to the 1,250 gallons.

G. L. MITCHELL, a witness for claimant, testified:

I live in Atlanta, Georgia; am manager of the manufacturing department of the Coca Cola Company, and was such in October, 1909. It is my duty to see that the premises are kept clean. The premises and the two floors are cleaned three or four times a week, or just as often as necessary. The storage or mixing tanks are hardly ever used a second time without being washed out, and the kettle or cooling tanks are cleaned periodically. It is also among my duties to see that the operatives are dressed properly and take the proper precautions to insure cleanliness. When they come in from the street and before going to work they put on overalls and shoes, which are worn only in the factory.

The negro does not chew tobacco. When he is working around the kettle he wears overalls and a jacket. I never saw him around the kettle with nothing but a shirt on.

JAMES GASTON, a witness for claimant, testified:

I live in Atlanta, Georgia. I have been working for the Coca Cola Company twelve years. I cook the Coca Cola syrup and dump the sugar into the kettle. I have been cook for five years. I do not, nor did I ever, chew tobacco. In the factory I wear overalls and a jumper and heavy shoes with good bottoms and tops to them. I never wear these shoes outside the factory, nor have I ever worked around the kettle in undershirt without jacket, or with shoes on with my toes sticking out the front of them. It would be dangerous to wear such shoes because the stuff splashes out of the kettle and would scald my feet. If any of the sugar scattered on the platform, we took a shovel and shoveled it in. I never swept up anything off the floor and put it in the kettle.

Dr. JOHN W. MALLETT, a witness for claimant, testified:

I am a chemist and have been since 1855. I have been professor of chemistry in several institutions; have been doctor of chemistry; also engaged in investigations for commercial and other purposes practically through that whole period. I was educated at the University of Dublin and Göttingen; have been professor of chemistry in the State University of Alabama and Texas and the Medical College of Alabama at Mobile; the medical department of what is now Tulane University; the Jefferson Medical College of Philadelphia, and the greater part of the time at the University of Virginia. I have frequently been called upon to examine food products for commercial purposes.

I have analyzed three samples of Coca Cola syrup and found them to contain sugar, 52.51 to 52.64%; caffeine, 0.19 to 0.21%; phosphoric acid, 0.25 to 0.30%; citric acid, 0.03 to 0.04%; tannin and extractive matter, 3.42 to 4.25%; mineral matter other than phosphoric acid, 0.06 to 0.09%; alcohol, 0.53 to 0.60%; water, 36.34 to 42.95%, with minute amounts of essential oils. I have made analyses to determine the amount of caffeine that is present in an ordinary cup of coffee or tea and drinks of coca cola. I found 1.54 grains caffeine in 5 fluid ounces of black tea, 2.02 grains in 8 fluid ounces of green tea, 2.61 grains in 5 fluid ounces of a mixture of  $\frac{3}{5}$  coffee and  $\frac{2}{5}$  milk, 1.74 grains in one fluid ounce of black coffee; 1.21 grains in one fluid ounce of fountain Coca Cola syrup; and 1.12 grains of caffeine in one fluid ounce of Coca Cola syrup for bottlers.

I have seen Merchandise No. 5 manufactured at Maywood, N. J. The materials entering into its composition are three in number. The coca leaves, previously deprived of their cocaine with associated alkaloids, cola nut, and

wine—dilute alcohol in the form of wine. Roughly speaking, there were about three times as much of the coca leaves used as of the cola nuts.

Caffeine is a drug when used for medicinal purposes, but it is not always, under all circumstances, a drug. I have had personal experience with the use of caffeine-containing beverages and general observation of others who use it. The general result of my observation is that the use of caffeine or beverages containing caffeine in moderation is not only not harmful, but absolutely beneficial, sometimes very markedly so; and then, on the other hand, the excessive use of caffeine would undoubtedly give rise to disorder to a certain extent or disturbance to health. I am of the opinion that caffeine is not a "habit-forming" drug within the correct use of the expression.

Merchandise No. 5 does not have the odor of toluol, nor could such odor be detected in it.

While I hold the degree of doctor of medicine, I have not practiced and therefore would not qualify as a physician, but am sufficiently acquainted with medicine to be able to state that the moderate use of caffeine-containing beverages is beneficial to health, and to that extent I qualify as a doctor of medicine.

I have made analyses for one of the baking powder companies, but have not been in their employment continuously. I was asked by the president of a baking powder company to ascertain whether the use of alum in baking powder was wholesome or unwholesome, and agreed to make the investigation provided I was permitted to make a scientific investigation with freedom to publish the results no matter what they should be. The experiments were made, and I published the results in the London News as a matter of science. The results were adopted and, I believe, were used by the baking powder companies. I made no public statement of the results being used or of being paid by the baking powder company until the facts came out in connection with a congressional investigation, but I never misstated the relation which I sustained with the baking powder company.

Caffeine is a stimulant, but not a poison, using the word "poison" in the ordinary accepted scientific sense. The word does not admit of an exact definition, because even by scientific men it is used with a certain amount of variation, but I understand, as the general accepted meaning of the word among scientific men, it is any substance which when taken into the body in stated amounts, and usually in relatively small amounts, acting chemically, is capable of producing on ordinary persons, or an average person, death or grave injury to health.

CHARLES E. CASPARI, a witness for claimant, testified:

I have been a chemist eleven years. Graduate of Johns Hopkins, baccalaureate and Ph. D. Have been engaged in analytical work ever since graduation. Hold the chair of chemistry in the St. Louis College of Pharmacy. Have had experience in the examination of food products.

I have analyzed two samples of Coca Cola syrup, and found 1.21 grains of caffeine per fluid ounce. Between November, 1910, and Christmas, I analyzed ten cups of black coffee without cream for their caffeine content, which I procured in Chattanooga. I found them to contain, respectively: 1.56, 2.45, 1.25, 2.93, 1.53, 1.78, 1.96, 1.95, 1.26, and 2.02 grains of caffeine. The average is 1.87 grains of caffeine per cup.

I have seen Coca Cola manufactured at the factory in Atlanta. There was no evidence of tobacco. The platform upon which the kettle rests was clean. The floor of the basement and the mixing tanks were clean. I have also seen merchandise No. 5 manufactured at Maywood, N. J. Three hundred and eighty

pounds of coca leaves and one hundred and twenty-five pounds of cola nuts are used to make 900 gallons of Merchandise No. 5. After I finished watching the process by which No. 5 was manufactured, samples were taken. I made an analysis of merchandise No. 5, and determined the caffeine in it. I detected qualitatively the presence of tannin and also of chlorophyll.

The Monsanto Chemical Works supplies caffeine to the Coca Cola Company. It has consulted me on one or two occasions, but not generally.

In analyzing Merchandise No. 5 the tannins were determined qualitatively only. I did not determine them quantitatively, because I did not know how. The tannin-like substance was the same kind of substance as in coca leaf and same in Coca Cola syrup. I know this, because all three treated in the same way responded to the same reaction.

The tests for tannin were suggested to me by Dr. Mallet.\* My only experience with tannin is as stated in the experiments I have given. I do not profess to be a specialist in tannin analysis.

J. F. JOHNSTON, a witness for claimant, testified:

I am proprietor of the local Coca Cola Bottling Works at Chattanooga and was proprietor at the time of this seizure. I sent samples drawn by me personally out of the forty barrels and twenty kegs seized in this case to various witnesses for claimant.

We have bottles made at the different factories. The words "Coca Cola" on the bottle has no hyphen between them. The bottles are made on my order. The Coca Cola Company has nothing to do with the manufacture of them.

A. SHERMAN CLOUTING, witness for claimant, testified:

I am a physician, graduate of the Jefferson Medical College in 1896, and have been practicing practically ever since. I practice general medicine, and along with that I have worked on nervous and mental diseases for a number of years. I am a physician for the almshouse and am and have been about three years examiner for the insane at the Philadelphia General Hospital. I know Edward H. Corry, and examined him about July 16, 1910. He was insane when I examined him. He was depressed and apathetic.

Dr. HENRY A. NEWBOLD, witness for claimant, testified:

I am a physician. Have practiced my profession since 1893. I graduated from the University of Pennsylvania in medicine. I graduated from the Philadelphia College of Pharmacy in 1870. Since about 1895 or 1896 I have devoted myself for the greater part to nervous diseases. I have been connected with the Philadelphia General Hospital for the past ten years as an examiner for the insane. We examine the patients brought into the detention ward. I examined Edward H. Corry sometime between July 14 and 16, 1910, and signed his commitment papers on the 16th. He was neuropathic always, an unstable nervous condition, and at the time I examined him he was actually insane. I would not say that he was always insane in that sense.

Dr. R. C. KELL, witness for claimant, testified:

I am superintendent of the Chester County Hospital for the Insane at Embreeville, Pa. I was an assistant physician in the Philadelphia Hospital for the Insane, and had charge of the receiving ward in the insane department when Corry was admitted July 20, and I examined him alone. He was apathetic in appearance, more or less depressed. I concluded that the man was insane first, and from the symptoms that he showed I classed him as a psychopathic deficient in nature. His condition could not have been brought about by

drinking soft drinks containing caffeine. I do not think any external thing brought about his mental state. It was congenital deficiency existing from the time the man was born.

I have made no special study of the effect of caffeine on the brain. I know that it stimulates the brain and acts as an excitant. I do not know what an overdose of caffeine would produce on the brain.

Dr. V. C. VAUGHAN, a witness for claimant, testified:

I live in Ann Arbor, Mich. I have been a teacher in the University of Michigan since 1876, and am dean of the medical department and teach the medical students physiological chemistry and hygiene, and lecture to the law and medical students on medical jurisprudence. I have studied in Berlin and Paris. I have a bachelor's degree and a master's degree, doctor of philosophy and doctor of medicine. I have an honorary degree of doctor of medicine from the University of Illinois, honorary degree of doctor of science from the University of Pittsburgh, and honorary degree of LL. D. from the University of Michigan and Central College, Mo. I know the substance caffeine, which is an active ingredient of coffee and tea and certain other beverages. Caffeine is an alkaloid substance and is found in plants. It belongs to the xanthine group of bodies. It is a trimethyl xanthine. Caffeine is found in tea, coffee, chocolate, Paraguay tea, Guarana, and in small quantities in certain plants in this country of the Ilex. Caffeine is part of the daily ration of every soldier. I know of no hospital in the world from which caffeine is excluded. There is a large hospital under my direct control at Ann Arbor, Mich. Coffee and tea are used as regular articles of diet at that institution. One of the normal constituents of the human body is xanthine. Xanthine is found in practically all plants and animals. It is a constituent of the cell—every living, growing cell—in a plant or animal, and when those nucleus substances of the cell break up more or less xanthine is set free. Caffeine is a trimethyl xanthine, and when taken into the body it is stripped of its methyl accompaniments and reduced to dimethyl and monomethyl xanthine, and sometimes probably to xanthine itself.

I have done a great deal of toxicology work. Whether caffeine is a poison or not depends on the amount given and the avenue of administration—how it is given. A poison is a substance, as we understand it, which when taken into the body, on account of its chemical constituent, seriously impairs or destroys the functions of some part of the body or it may kill, or simply impair. I never have known or heard of an authenticated case of death resulting from the use of caffeine in any quantity, and I think I can say that there is not on record—no authenticated record—of fatal poisoning with caffeine.

The report in the Allard case shows that caffeine has absolutely nothing to do with it. It is headed "Cases of theocine poisoning." Theocine is not caffeine. Theocine is an artificial dimethylxanthine, artificially made. It does not come from caffeine. In one of the cases mentioned by that report caffeine is given as an antidote to save a man after he has been poisoned with theocine. I read the original of the Zenetz cases. The title of that case shows what it means. We use caffeine in diseases of the heart and kidneys. It is true the article is somewhat loosely written and may be interpreted in several ways. He states that the woman was "gesund" (sound) in health. Later on he says she was not entirely well, and when she died he says it was difficult to cut the heart with a knife. Neither caffeine nor any other acute poison can produce any such condition of the heart. Such a condition of the heart could be the result only of disease. It must have been a fibrous or calcareous degeneration of the heart. Besides, the title of the article is "The use of caffeine in diseases of the heart and kidneys," and the author simply

claims it is dangerous to use medicinally too large doses of caffeine when applied for diseases of the heart or kidneys. The effect of caffeine in moderate doses is certainly beneficial. The whole history of the world shows that to be the case. Caffeine slightly stimulates—I mean when it is taken as a beverage. It slightly stimulates the nervous system. It makes the muscles work more smoothly and easily and more effectively. —It has, however, probably some slight action on the kidneys. Caffeine is no more poisonous than xanthine, which is a normal constituent of the human body. It is a question as to whether it is as poisonous or not. Whether stimulation is injurious to the human system in a moderate amount depends upon the extent to which the stimulation is carried. Stimulation in a moderate amount certainly is not injurious, but is beneficial. We could not live without a certain amount of stimulation.

I am of opinion that Coca Cola syrup taken in the form of a beverage in proportion to one ounce of syrup to 6 or 7 ounces of carbonated water, taken five or six times in the course of a day would not produce injurious effects. I have no doubt it would be stimulating to the brain and muscles, and to some extent, possibly, the kidneys slightly, but such stimulation would be normal.

I conducted some experiments on animals with caffeine. I used guinea pigs in my experiments with caffeine, and from the 2d of February, 1910, to the 16th of May, inclusive, I gave one set of guinea pigs  $1/30$  of a grain of caffeine by the mouth every day for 104 days. To another set of guinea pigs I administered  $1/15$  of a grain of caffeine by the mouth every day from March 26 to May 16, inclusive, about 52 days. I saw no ill effect from the caffeine. Dr. Hektoen came to Ann Arbor and made a post-mortem on both the caffeine fed pigs and the control pigs as well. An excessive quantity of caffeine would lead to nervousness. Whether caffeine is a habit-forming drug depends altogether on the use of the word "habit." Caffeine could be called a habit-forming drug in the sense that we get in the habit of taking certain foods at a certain time, but it is not a habit-forming drug in the sense that we use it as applying to morphine, or cocaine, or chloral, or other drugs of that class. It is not a habit-forming drug in the sense that a person who becomes accustomed to the use of it requires a constantly increasing quantity. It is a fact that the person who makes a cocaine or opium habit does require constantly increasing quantities in order to produce the effects sought and finds it difficult to leave it off of his own accord. So far as I know personally or from observation there is no depression following the taking of caffeine as a beverage in ordinary doses.

I have made no study of Coca Cola except as to the caffeine. I have observed persons accustomed to taking Coca Cola, but have made no special study of them, and don't know anybody who takes it. Caffeine is used as a medicine. There is no doubt about the poisonous action of paraxanthine, and I rank it as such in a book written by me. Yes; I wrote a book on poisons and sent it out to the world, but it contains a great many things I know nothing about. What I don't know about the xanthine bases would make a big volume. I admit that when I said caffeine is beneficial because it is related to the xanthine group or bases, that there are a great many things about xanthine I do not know. I stated in my book that xanthine causes muscular rigor and general paralysis, but not increased irritability. I know it produces convulsions in animals as I have tried it.

I wrote the Lomb prize essay for "Healthy homes and health food for the working classes." It was written for the American Public Health Association. In that book I stated it was not necessary to go into details concerning coffee, since it resembles tea in so many of its properties. That the active principle of coffee called caffeine is identical in chemical composition and physiological

effect with thiene of tea; and I further stated that the only time when tea should be used is late in the day, after the heaviest meals have been taken. Since writing this book my opinion has been modified by twenty years' experience and observation, and I would not state that the use of tea or coffee need be confined to the latter part of the day. I further stated that for weak and debilitated persons coffee or tea are not suitable and should be used very sparingly, but I should not now be so solicitous for the effect of tea and coffee on the weak and debilitated. Coffee and tea have a tendency to produce sleeplessness, and if a man does not get normal sleep or rest his health might be impaired as a result and premature nervousness might be brought on. In my book on Cellular toxins, I stated that the action of caffeine is directed upon the central nervous system, the muscles and the kidneys. The effects on the former—that is, on the central nervous system—is one of increased reflex irritability, which, as in the case of strychnine, may lead to complete tetanus and even paralysis. By tetanus I mean convulsions. The muscles contract more easily and with large doses they become permanently contracted, passing into a condition of coagulation like that caused by heat and cold.

Two grains of caffeine taken by the mouth is a moderate dose, and I should say, eight or nine grains a day—that is, 24 hours—distributed throughout the day would be moderate. I have stated in my book that a poison is “a substance that combines with and consequently interrupts the functions of the cell of the respiratory centers of the brain, causing the speedy death of the individual, while those substances that destroy the blood and the liver and the kidney cells are slow poisons, inasmuch as the life of the individual may survive the destruction of a large number of these cells, but those of one class are just as truly poison as those of the other.”

I also made the statement that “considerable discussion has been carried on over the question of whether or not its use (that is, meaning tea, in which the active constituent is theine) increases waste of tissue. This may now be considered as settled in the affirmative.” There have been, however, experiments since then that controverted that, though I have not conducted any.

To determine whether or not caffeine is a poison, the age, size, and the temperament of the individual should be taken in consideration, and, therefore, what might be a moderate dose for one individual might be a very immoderate dose for another. I should say that caffeine should not be given to children under seven years of age, because there is already in their bodies a large amount of tissue which furnishes the xanthine bases. The glandular tissue in the child is much greater in proportion than it is at any other time in his life, and he gets the xanthine in his body, and often gets it in excess, and xanthine is often found in the kidneys of a child.

Because a certain drug does not produce an observably harmful effect does not at all prove that it is not deleterious. Even one or one and a half grains of caffeine may prove harmful to many persons, and I have no doubt there are many people who should not take caffeine at all. I would prohibit caffeine altogether to children under seven years of age, and even above that age there may be some, and no doubt there are many, to whom it should not be given.

L. SCHAEFFER, a witness for claimant, testified:

I am president of the Schaeffer Alkaloid Works of Maywood, N. J. We make Merchandise No. 5 for the Coca Cola Company. It is made from the coca leaf and the cola nut, and of dilute alcohol. The alcohol is used to extract from the bodies mentioned the extractive matter. Nothing else is used essentially in making the preparation.

The process of making Merchandise No. 5 consists of two parts. The first part is to decocainize the coca leaf.

The second part of the process consists in putting the decocainized coca, with powdered cola nut, into large wooden tanks or into a large wooden tank. Prior to the introduction of the coca and cola a quantity of dilute alcohol has been filled into the tank. The proportions which are used in the process are as follows: 380 pounds of coca leaf and 125 pounds of cola nuts, and 900 gallons of dilute alcohol, of about 20% strength, is taken. The extract obtained is pasteurized in another tank by heating same to a temperature of about seventy degrees centigrade. The pasteurized extract is then filled into wooden barrels, being merchandise No. 5. This process introduces all the extractive matter which can be taken out of the coca leaf, and the cola nut into merchandise No. 5, with the exception of alkaloids of coca leaf. The hydrocarbon toluol which is used in extraction of cocaine and associate alkaloids from the cola leaf does not take any of the water extract substances out from the coca leaf, the same remaining in the leaf. There is a large percentage of matter in the coca leaf which can be taken out with a percolation with water or dilute alcohol. To make a water extract or an extract with dilute alcohol from the coca leaf means to treat the leaf with water or dilute alcohol, so that the water or alcohol soluble substances are taken out. The amount or quantity of extractive matter in coca compared with the quantity of alkaloid in coca is considerably larger, perhaps twenty times as large as the latter in weight. In other words, the extractive of coca leaf, which is done in the first part of above-described manufacturing process, takes out only a very small quantity of substances in the coca leaf, about one per cent only, whilst in the second part of the process that proportion extracted with dilute alcohol is about twenty times as much as is taken out with the hydrocarbon. This is essentially the process I use in my factory to manufacture merchandise No. 5.

I have been manufacturing merchandise for the Coca Cola Co. for about eight years, and this is the process I have always used. I am the inventor, practically, of the process and the machines.

JOHN M. McCANDLASS, a witness for claimant, testified:

I live in Atlanta, Ga. I am an analytical chemist and have been such for twenty-five years. I was State chemist of Georgia for about ten years. I analyzed a number of cups of coffee I bought in restaurants in the city of Atlanta, and find the average caffeine content to be 1.92 grains.

About May 2, 1906, while I was serving as State chemist of Georgia, I received a letter from the New York Observer, requesting me to send them a copy of the analysis, if I had made an analysis, of coca cola at any previous date, and I had analyzed coca cola about two years previously. In my reply I said, "The worst thing I find in coca cola is caffeine, which is the active principle of tea and coffee."

P. A. WESSENER, a witness for claimant, testified:

I live in Chicago, and am a consulting and physiological chemist. I graduated from the University of Michigan in 1888, receiving a degree of pharmaceutical chemist. I entered the College of Physicians and Surgeons in 1891, which latter became the medical department of the University of Illinois, and graduated from this institution in 1894, receiving the degree of M. D. I held the chair of chemistry in the medical department of the University of Illinois for about 12 years. I am president of the Columbus Laboratory of Chicago, which is devoted to research and analytical examination. The medical department takes up pathology, bacteriology, and physiological chemistry. I have made



analyses of Coca Cola. The fountain syrup contains two-tenths of one per cent of caffeine, or about 1.21 grains to the ounce. The bottlers' syrup contains about 1.1 grains.

Chocolate contains theobromine which, in the coca nibs, varies from about 1 % to 1.38 %. Theobromine and caffeine chemically are very closely allied. Theobromine is a dimethylxanthine, and caffeine is a trimethylxanthine. The caffeine acts upon the muscles and also the central nervous system. Theobromine does not act very much on the central nervous system, but is a much more powerful muscle stimulant than caffeine. Caffeine is a most powerful nerve stimulant. I have read the literature on the subject of toxicology. The word "poison" is, of course, a question of definition. There is no substance known that inherently is a poison. For example, take strychnine. We know that strychnine, as used in the ordinary accepted sense, is a poison. We also know that a half grain of strychnine has caused death. Nevertheless, when that strychnine in lesser doses is given, we know that it is an excellent remedy, and in doses of 1/60th of a grain taken two or three times a day could be given for four or five years—I have given it that long without producing any injurious effects, but really beneficial effects.

If you reduce strychnine to one ten-thousandth of a grain, it would not have any effect whatsoever. But to give you a definition under the explanation which I have given, which is the best I can give, I would say that any substance when introduced into the body in sufficient strength and in relatively small quantities and acting chemically is capable of producing death or serious injury to health in the case of an ordinary individual in average health. Under this definition caffeine is not a poison. I have not been able to find in literature a reported case of death resulting from the use of caffeine in any quantity by a human being. I have examined the Allard and Zenetz cases in the German language referred to by witnesses for the Government. The Zenetz case is rather contradictory. It reads that the woman was in good health in the first instance, and afterwards says she was not feeling well, and says she went to a medicine chest containing, among other things, a box of caffeine citrate. There were twelve powders in the box, of which she took five, and later on took five more, but what became of the other two powders is not stated, and there is no indication that she took caffeine, because no examination was made of what was in the box, and no examination of the body was made. I am familiar with the use and effect of caffeine in coffee, tea, Coca Cola, and other beverages. Caffeine, when taken that way, acts as a mild stimulant. It acts on the central nerve system locally—that is, moderate doses—and on the muscles, and in that way liberates more energy. It induces, under these conditions, or under the action of the stimulant, more activity and better muscular tone. Habit, as applied to drugs, refers to a constant desire for a certain substance, usually in increasing doses. Such a habit is usually followed by fatigue after the first stimulating effect has passed off. In that latter sense caffeine is not a habit-forming drug. I drink two or three strong cups of coffee a day. I have been doing that for at least twenty or twenty-five years. I take in this way from five to seven and a half grains of caffeine every day in my mouth.

Last October while in Jefferson, Texas, I drank on an average five or six glasses of Coca Cola a day, which took the place of coffee, tea, and water. I am not aware that it affected my nerves, body, or mind. I was stimulated and felt better and slept just the same every evening as though I had my coffee and had gone through my daily exercise at home. I take Coca Cola once in a while, but have acquired no habit for it. It is a little too sweet for me. The qualitative effect of caffeine varies with the quantity. In the first place you could not have a qualitative effect unless there is sufficient quantity to produce

it. For instance, I could not get a qualitative test for a substance unless there was sufficient quantity to give that test. Commencing in August, 1910, I conducted some experiments on rabbits with caffeine. One rabbit was always used for a control rabbit, and the others were given caffeine, but all rabbits were treated alike as to the amount of food and exercise given. The rabbits to which the caffeine was fed showed no unusual symptoms when given 50, 100, and 150 milligrams of caffeine daily. A little over a grain and a half of caffeine administered to one rabbit in one day caused a slight disturbance of breathing, but no other noticeable symptoms. On September 17th and 19th 200 milligrams of caffeine were administered daily. That would be equivalent to about 3 grains. Then one of the animals was fed 250 milligrams of caffeine daily, except Sunday, for a period of 21 days. All of the rabbits retained their vigor throughout the experiment and were in a thoroughly healthy condition when slaughtered. On October 14th all of the animals were killed and post-mortem examinations conducted by Dr. Ludwig Hektoen, of Chicago, in my presence. They showed nothing abnormal.

On October 3, 1910, I started feeding another rabbit caffeine, giving it 100 milligrams daily, except Sundays, and continued the feeding until February 6, 1911. The rabbit increased in weight 143 per cent during the period of the experimentation. At the end of the period the rabbit was killed and post-mortem conducted in my presence by Dr. Hektoen. Nothing abnormal was found. No caffeine could be recovered from the livers, carcasses, or urine of any of the animals, which shows that the caffeine had been destroyed—that is, it was no longer caffeine, and could not be identified as caffeine. All of the rabbits increased in weight during the experiments. As to whether caffeine has a greater effect on rabbits or human beings, I would say, in the first place, that rabbits live on a food that is almost free of purin bases or xanthine bases, whereas man, in his food, continually and always has taken xanthine bases, and in that way man has quite a tolerance to such products, whereas a rabbit has not acquired a tolerance in the same manner or degree. It would be true in most instances that an animal that had acquired a tolerance for a substance could take it with less effect than an animal that had not acquired that tolerance; but I would further state that a rabbit's economy has the power to change caffeine rapidly and quickly into less methylated products, and possibly also xanthine—simple xanthine products—and this same process also takes place in the economy of man. These rabbits were given large doses, equivalent to 50-grain doses to a man weighing 150 pounds. From my personal experience and from the literature, I would say that an adult of average weight could take from 20 to 45 grains of caffeine per day. I would not say that they should take that every day, but I think they could take that without causing any injurious effects. I have performed experiments on human beings to determine the physiological effect of caffeine; the object of this experiment was to show that the body of a human has a power to split off the methyl groups in the caffeine. A healthy individual was used—a young man weighing about 140 pounds. The amount of caffeine given this individual was three grains each day for the first, second, and third days. It was given as the natural constituents in the coffee and tea which were analyzed for the caffeine content. On the fourth day, when he commenced to take the caffeine in addition to what was usually found in the coffee and tea, the total amount of caffeine was 11.8 grains. On the fifth day, 13.8 grains, and on the sixth day 13 grains of caffeine.

No injurious effect was produced on the health of this person as far as I was able to observe, and urinary analysis showed an absence of caffeine from the urine. I am the same man who wrote a letter to the Coca Cola Company April 15, 1907, stating the results of analysis made by me as to the contents

of a gallon of Coca Cola syrup, but they had no right to publish that analysis, and I wrote them so after they published it. It was published with the Coca Cola advertisement. I examined the syrup for caffeine, cocaine, and alcohol in that analysis. I found no cocaine present. Barring the sugar and caffeine content I found no material difference between the second and third analyses. The fountain sirup contained 0.59 of one per cent alcohol by volume and bottler's sirup 0.48 of one per cent alcohol by volume. In my first report, made on April 15, 1907, I made the statement, "The contents of this jug were submitted to very careful and exhaustive analysis for cocaine and alcohol, and we failed to find any trace of either." I would not swear that was absolutely correct as to alcohol, but I followed the official chemists' methods to be used in making these tests under the food and drugs act, and I followed out those directions to the letter, and that is the result I got. If the method errs it is not my fault. I have not practiced pharmacology or made any experiments, but have had considerable experience in physiological chemistry. The inquiries which I made as to the results of caffeine on animals was to find out, first, whether caffeine was destroyed in the body; second, if there was any caffeine excreted as such or left in a free condition in any part of the body, and third, to see whether there were any changes produced in the organs or economies of the animal while being fed caffeine. I was not inquiring as to the stimulating effects or the action on the central nervous system or on the muscles or kidneys from a pharmacological standpoint.

ROBERT L. EMERSON, a witness for claimant, testified:

I reside in Boston, Mass., and am a chemist by profession. I was graduated at Harvard University in 1894. In 1896 I entered Harvard Medical College and graduated in 1900. I spent the following year and three months in Germany studying chemistry, and on my return was appointed a teacher in physiological chemistry at the Harvard Medical School, where I taught for five years, teaching physiological chemistry, medical chemistry, toxicology. I left the Harvard Medical School in 1905, and since that I have had a laboratory of my own, where I do special research work. I have the degree of M. D., but have never practiced medicine. Caffeine acts as a stimulant. Whether that effect is injurious to the body depends upon the degree of stimulation. I have made experiments tending to show the effect of caffeine when taken into the system of both men and animals. I have studied the effects of caffeine, taking Coca Cola syrup, on the nutrition processes of the body by experimentation with two men, one of them weighing about 180 pounds, 23 years old, and another about 105 pounds, about 15 years old. The conclusions from these experiments can be summed up briefly by saying that the administration of caffeine even in large doses, as these were, is without any effect upon the amount of urine or upon the amount of nitrogen, which is taken to a certain extent as an indication of the intake and outtake of the body; nor does it show any very great variation in the purin nitrogen beyond that accounted for by taking of that kind of nitrogen; nor does it have any effect upon the amount of uric acid. The experiments conducted on these two men did not disclose the effect of the drug on the brain, because I did not examine that, and prove nothing as to the consumption of brain or nerve tissue or as to the heart.

JOHN F. QUEENY, a witness for claimant, testified:

I reside at St. Louis and have been connected with the drug and chemical trade some thirty-nine years. The company of which I am president and general manager buys considerable quantities of tea and occasionally coffee, and I have had every opportunity of gathering statistics on tea consumption. I

have compiled some figures on certain periods from the statistics issued by the Bureau of Statistics of the Department of Commerce and Labor, covering a period since 1824. My figures are not exact, but are an underestimate. The world's consumption of coffee during 1909-1910 was 2,388,998,568 pounds, and during the season 1908-1909 it was 2,461,747,464 pounds; for 1907-1908 it was 2,313,355,976 pounds. The percentage of caffeine, according to the Government's figures, was 1.35%, but I base it on 1.5%. The world's production of tea, as shown during the season of 1909-1910, was 1,200,000,000 pounds. I calculate the percentage of caffeine was 2.75%. The Government's figures run a little over 3%. The amount of caffeine in the entire coffee for 1909 was 60,000,000 pounds. I have here also the figures of Maté and Paraguay tea, which are quite important, in my opinion, in the quantity of caffeine to be shown. May, 1905, 110,000,000 pounds of Maté or Paraguay tea, containing 1.25%, showing consumption of caffeine in Maté of 1,375,000 pounds.

Dr. RUDOLPH WITTHAUS, witness for claimant, testified:

I live in New York. Am a chemist and toxicologist and teacher of those subjects since 1876. Graduated from Columbia College in 1867; then studied in Paris at the Sorbonne and the College de France. I graduated in medicine at the University of the City of New York in 1875. I wrote a small book on chemistry for medical students and a laboratory guide for them; also a chemistry for medical students now in its sixth edition. I wrote the toxicological parts of Witthaus and Beckers Medical Jurisprudence and Toxicology which is now in press. I am a teacher of chemistry and toxicology and medical jurisprudence in Cornell University and emeritus professor in the University of Des Moines. I was chemist of the city of Buffalo, and also chemist of the State dairy commissioners of the State of New York. Toxicology is the science of poisons. A substance may produce deleterious results in several different ways. In the first place, it may act mechanically and produce disturbances in that manner. For instance, in the case of glass or other fragments, or by physical action as in the case of extremely hot water, or it may produce deleterious results by local chemical action which destroys the tissues with which it comes in contact, like sulphuric acid, or it may produce deleterious results by organized material which occurs in the system and produces detrimental results and it may act chemically upon the blood, or it may be carried by the blood to other parts of the body and there produce chemical action which is detrimental which is the case in true poisons; or substances can be taken in excessive quantities, substances naturally taken may also, when taken in excessive quantities, produce deleterious results by the increased quantity. For instance, you may take too much food of one kind or another. When caffeine is taken it is absorbed from the alimentary canal more or less and carried into the blood and dissolved and carried into the several organs and tissues of the body. If taken in exceedingly large quantities or by a person who is afflicted with an idiosyncrasy for it, it may produce unpleasant or deleterious results. That is the only way in which I conceive that it can do that. The results would be of a temporary nature. From my experience as a toxicologist and from the reading of literature, I know of no case of caffeine in any quantity producing death. I have read the Allard and the Zenetz case in the German language and neither of them is a case of death by caffeine. The effect of caffeine on animals would not necessarily afford conclusive evidence of its effects on human beings, because the effect of different drugs on different animals is different in kind and in character, and you can not argue from the effects on animals as to the effect on man, except merely as a preliminary indication. Caffeine taken in the form of beverages is not a habit-forming substance from my experience. When I

don't get it I don't miss it. I wrote a book on toxicology in which I undertook to collate the statistics for a nine-year period as respects certain poisonous drugs.

I took the statistics from other authors. On page 56 there is given thirteen cases of caffeine poisoning in nine years. I have never made any experiments with caffeine or Coca Cola. Dr. Hare wrote a treatise on the effects of caffeine. It is standard. He makes the following statement: "On the nervous system caffeine acts as a rapidly acting stimulant exerting its chief influence on the brain and the spinal cord." "By its cerebral effect it causes increased rapidity of thought; by its influence on the spinal cord it increases the reflex activity, and for this reason it is said to make people nervous." I agree to the first statement, and while I have heard the second statement made many times, I have never had that experience. Dr. Hare also stated: "It is important to remember that it has no effect on brain protoplasm except to stimulate it, and that ultimately a brain driven along by caffeine breaks down by the concentration of its energy for the time being in one effort." I have not experienced that. It is also stated that, "Caffeine has been supposed to increase the pulse-rate and blood pressure by stimulating the heart muscle, but from recent studies in the United States and abroad it would seem probable that these changes are indirectly produced and due chiefly to its stimulating action on the nervous system": but I do not agree to that statement. "Clinically, it certainly seems to raise the blood pressure in almost every instance where it is used." As to this statement, I do not know. In speaking of the untoward results of caffeine on the human system, Dr. Hare states, "Caffeine often produces so much insomnia when given in cases of cardiac disease that its use has to be discontinued. If its use is persisted in it may produce a condition of delirium closely resembling that of alcoholism; and if too large doses are used or it is too frequently repeated, it may cause a decreased urinary flow by causing spasm of the renal vessels. The writer has also seen marked rise of temperature follow its uses in the doses of 2 grains (0.12) three times a day, but this is unusual. In certain persons the habitual use of coffee may cause insomnia, tremors, palpitation, tinnitus, auris, gastralgia, and emaciation." Caffeine when taken into the system is demethylated usually into one of the dimethyl xanthines—paraxanthine, theophyllin, or theobromine—but which one I don't know. I admit that paraxanthine is moderately poisonous. Theophyllin, or its synthetic reproduction, theocin, is poisonous, and that is what is reported to have killed the patients in the Allard cases. I am not prepared to say that its physiological effect would be at all different from that of theophyllin. Notwithstanding that one of the groups is poison, paraxanthine, and another one of the groups killed patients in the Allard case, I do not admit that caffeine is a poison, though it contains at least two of these groups that killed people. I don't admit that theocin killed the people in the Allard cases.

H. C. Wood, Jr., a witness for claimant, testified:

I live in Philadelphia, and am professor of pharmacology and therapeutics in the Medical Chirurgical College of that city. I graduated in the University of Pennsylvania in medicine. After my studies in Europe, I was appointed teacher of pharmacodynamics in the University of Pennsylvania, with which institution I was connected continuously until my election as a professor in the Medical Chirurgical College. I have written a number of articles on pharmacological subjects. I am one of the editors of the United States Dispensatory. I am second vice president of the committee of revision of the United States Pharmacopœia. I made experiments by hypodermically injecting caffeine into frogs. Contractions in the muscles which had received the caffeine were larger

and more noticeable than in the normal muscle. I came to the conclusion that caffeine increased the working capacity of the muscle with probably a less expenditure of energy, because when the experiment was continued over a long period of time, and the muscles became exhausted, I found the total amount of work that the muscle was capable of accomplishing was greater under caffeine than under normal conditions. I performed a number of experiments on different individuals, myself included among them, concerning the action of the drug on the circulating system. I found that under the influence of caffeine there was a slowing of the heart, with generally no great alteration in the blood pressure (that is, in the force of the circulation), but in one person who never used any form of a caffeine beverage I found an increase in the blood pressure—that is, in the increase of force of circulation, with a slowing of the pulse. That would indicate that the muscles were working more economically, because the slower the heart works the more advantageous the work. It can accomplish the same amount of work with a less expenditure of energy by contracting slowly than by contracting rapidly, and the effect of the blood pressure is not lowered, so there is no weakening of the heart's force. In a book written by my father, entitled "Therapeutics and Its Principles and Practices," fourteenth edition, which I revised in 1908, the following statements appear (pp. 211, 214, and 216) :

"The conclusion seems established that in frogs caffeine acts as a motor spinal stimulation, but also as a muscle poison. It is a powerful muscular poison, at first producing a condition in which there is exaggerated muscular excitability, with a tendency to tetanic contractions upon momentary stimulation and after stiffness, weakness, and finally lost excitability. In poisoning by caffeine great increase in the secretion is a common symptom, and the statement of Gubler that the alkaloid is one of our most powerful and certain diuretics has received abundant confirmation. The effect of the drug upon healthy men would indicate that it does not act simply by regulating the circulation of the kidney, but has also a decided effect on the renal organ itself.

"In the advanced stages of caffeine poisoning the heart and the vasomotor system are without doubt depressed so that the fall of pressure is duplex. Experimental evidence, although it is not conclusive, does not point toward any marked effect of the drug upon metabolism."

H. L. HOLLINGWORTH, a witness for claimant, testified :

I am director and experimenter in psychology in Columbia University ; also director of psychology in Barnard College for the last two years. I took my A. B. degree at the University of Nebraska and served there two and a half years as assistant in psychology and then came to Columbia University as assistant in psychology in charge of advanced laboratory work, and took my degree of Ph. D. and was appointed to my present position. I have made experiments to determine the effect of caffeine on the mental and motor processes. (These experiments were explained by charts, which can not be reproduced here.)

JOHN MARSHALL, a witness for claimant, testified :

I reside in Philadelphia, Pa., and am professor of chemistry and toxicology in the University of Pennsylvania, which position I have held for thirteen years. I know of no authoritative case of death having been caused by the administration of caffeine. My recollection of the Allard case is that the substance administered was not caffeine, but was theocin. I am not inclined to believe that death was caused in the Zenetz case by the administration of caffeine. I should not say that caffeine was a habit-forming substance in the sense that morphine

and chloral and cocaine and substances of that sort are habit-forming drugs. I conducted an experiment under my personal supervision with respect to the influence of caffeine upon what was termed the nitrogen metabolism. The experiment shows that the administration of six grains of caffeine daily, divided into three doses of two grains each, has practically no influence upon what is termed the nitrogen or protein metabolism of a human being of adult age and normal health.

C. F. CHANDLER, a witness for claimant, testified:

I reside in New York and am a chemist by occupation. I am a professor of chemistry in Columbia University; studied at Harvard University and the University of Göttingen, in Germany, where I received the degrees of master of arts and doctor of philosophy. Was for six years chemist of the metropolitan board of health and for 11 years president of the Board of Health of New York. I have studied toxicology for the purpose of lecturing on it, and I have examined several cases of alleged poisoning where I have had occasion to analyze the remains of the deceased. I am familiar with caffeine. It is not a toxic or a poisonous substance. The use of caffeine in beverages does not result in any serious impairment to the health of any person using it. I have analyzed two samples of coca cola syrup to determine whether there was caffeine present. One sample contained caffeine and one did not. I also examined them for cocaine, but found none. The amount of caffeine found was 1.22 grain per fluid ounce.

E. R. LE COUNT, witness for claimant, testified:

I am a physician by occupation and have been a teacher of pathology in Rush Medical College for nearly 20 years. I received my technical education in Johns Hopkins Medical School and several places in Europe. I have held several thousand post-mortem examinations and am familiar with the appearance of animals ordinarily used in laboratories, both in health and in disease. The Zenetz case does not show anything practically from a pathological standpoint. I don't think there is any such thing as a caffeine heart.

L. HEKTOEN, a witness for the claimant, testified:

I live in Chicago; have been professor of pathology for about 16 years in Chicago Rush Medical College. I received my technical education partly in Chicago and studied at the University of Upsala, University of Berlin, University of Prague, University of Liverpool, and elsewhere. I have held several thousand post-mortem examinations, and am familiar with the appearance of animals ordinarily used in laboratories, both in health and disease. I went to Ann Arbor and spent May 17, 1910, there and examined 15 guinea pigs at Dr. Vaughan's laboratory. The results of the examinations were that in all the animals all the organs were found to be perfectly normal, both on gross and microscopical examination, except in the spleen of two guinea pigs there was a slight excess of pigment; but this was not, in my opinion, due to caffeine. I examined the brain, the lungs, the heart, the aorta, the liver, the spleen, the pancreas, the stomach and intestines, the kidneys, and the super-renal bodies, and in some cases the bone marrow, but found nothing except what I have stated that was in any way from the normal. I also examined four rabbits at Dr. Wessener's laboratory in Chicago. They all appeared to be practically normal to the naked eye and were also found to be perfectly normal under a microscopical examination, except that there were slight changes in the liver of rabbit No. 3 and in the liver of rabbit No. 6. I have made examinations of human bodies to ascertain if there was any change due to taking of

caffeine, but I found no changes that were attributable to the drinking of tea or coffee. From my examinations of rabbits, guinea pigs, and humans, I am of opinion that caffeine causes no change either in the lower animals or in human beings.

R. W. WILCOX, a witness for claimant, testified:

I am a physician, and have been engaged in practice in New York City for 30 years. I am a bachelor of arts of Yale, a master of arts of Oberlin College, and doctor of medicine from Harvard University. I served short periods in a hospital in Boston and studied 15 months in Vienna, Heidelberg, Paris, and Edinburgh. I think the average health adult can take, with benefit to himself, as a minimum 4 to 6 grains of caffeine a day. I have myself taken, as near as I can ascertain, 6 grains of caffeine a day for the last thirty years. I took forty-two grains of caffeine alkaloid within an hour, it flushed my face considerably, and I did not go to sleep until three o'clock the next morning, and it had a diuretic effect. Caffeine, taken in the form of beverages, is not a habit-forming substance in the sense that it is used requiring more to satisfy the real or fanciful longings for the substance. I have had occasion in my practice to prohibit patients using caffeine-containing beverages on account of the condition of the patient but found no difficulty in inducing them to discontinue its use. Caffeine in the form of beverages in moderate quantities will produce exaltation but the depression will not be below the level from which you started.

THOMAS E. SATTERTHWAITE, a witness for claimant, testified:

I live in New York City, and have been a practicing physician for 44 years. I was present and attending Dr. Wilcox a few days ago at the time he took a large quantity of caffeine that he has testified about. I was asked by him to test the action produced on his circulation and respiration by taking a certain amount of caffeine. He took 42 grains, the first dose was 10½ grains, taken at 3.04 in the afternoon and the second dose of 21 grains at 3.27; the next dose was 10½ grains taken at 3.54. I took the records 20 minutes after each dose. The result of the first amount of caffeine alkaloid increased the regularity of the heart; that is, it increased the force and strength of the heart. The next effect produced was a sudden rise in the pulse. The respiration also rose. The result of the second dose, the 21 grains, showed a remarkable increase in the strength. There was a change in the temperature but not a rise. There was a rise in the pulse. After the final dose was given, the pulse fell and the respiration fell to the natural and normal respiration of a natural and normal individual. The conclusion of this series of three experiments was that the pulse rate rose and the respiration increased a little, but with the last dose it fell to normal and the respiration fell to normal. At the same time at the end the irregularity in the force of the pulse was eliminated. I think a moderate amount of caffeine to be taken in beverages to be 5 or 6 grains per day. The effect of such an amount would not be harmful, but would be agreeable and quite stimulating. I have known of no permanent ill effect from the taking of caffeine in any kind of dose. I personally use caffeine in coffee and tea. This use of caffeine has never affected my health. I think there are occasionally times when a cup of coffee if taken stronger than usual will increase nervousness a little, but it has never had anything but a temporary effect on me.

HAROLD N. MOYER, a witness for the claimant, testified:

I live in Chicago and have been practicing medicine for 31 years; educated at Rush Medical College, medical department of Chicago University; served in the Illinois Eastern Hospital for the Insane for 13 years; afterwards studied



at the universities of Vienna, Heidelberg, Berlin, and returned to Chicago and became connected with the Rush Medical College as teacher, first of the department of physiology and then of the department of nervous diseases. Have made a specialty of nervous diseases since 1892. Caffeine is a nerve stimulant, but not of itself necessarily injurious or detrimental to health. The question whether the effect of caffeine stimulation is detrimental or not depends upon the degree of stimulation. Caffeine is as near a normal stimulant as we have. By moderate quantities, I would say that beverages containing somewhere from 4 to 6 grains of caffeine, taken in a single day would be mildly tonic or stimulating to the nervous system and would not have an unpleasant or uncomfortable result on the average person. Increasing the quantities more than from four to six grains a day would make the stimulating effect greater. The number of persons who would experience discomfort or uneasiness from such large doses would be increased, but as to how large a dose or how many, I could not say, and it might be that they would feel benefited apparently by it. I should say that eight or ten grains of caffeine could be taken daily without detrimental effect. The effect of an excessive dose of undue stimulation from caffeine would continue only so long as the substance remained in the system; not very long, a few hours. The use of caffeine in the form of beverages does not tend to form any habit. I have had occasion to prescribe to patients to discontinue caffeine-containing beverages from time to time, and found no difficulty in inducing them to discontinue its use. The effect of caffeine on young persons, say from 14 to 20 years, is not different from what it is on those more than that age. The effects of caffeine beverages are not more noticeable in those who are from 25 to 40 than in the young. The young tolerate these beverages rather better than those further along in life. Caffeine-containing beverages are prescribed as part of the diet in all the hospitals with which I am connected. That is, they are served throughout the hospitals unless restricted by the physician's orders, and that restriction would apply only to specific cases. The use of caffeine has never in my experience resulted in insanity or in disordering the mind. I think the effect of the other ingredients in Coca Cola syrup would limit the quantity that is ordinarily taken, first, because it is sweet, and then sugar is food and it is rather filling—that amount of syrup.

ALLEN M. HAMILTON, a witness for claimant, testified:

I am a physician, residing in New York, graduated in medicine at the college of physicians and surgeons, Columbia University, New York, in 1870. I have made a special study of clinical diseases of the mind and nervous system. I practiced general medicine for several years, and for the past 35 years I have practically devoted most of my attention to those special subjects. I was professor of clinical psychiatry in the medical department of the University of New York, and also of therapeutics at the college of physicians and surgeons. I have written a book upon clinical psychiatry, upon clinical electrical therapeutics, and a treatise on medical jurisprudence, and a book upon nervous diseases, a book upon the modern treatment of headaches, and a book on railroad accidents and injuries and their relation to the nervous system, and I have contributed frequently to medical papers and publications. I have made a study of the subject of caffeine-containing beverages. Caffeine has been taken by me to help me do my work. There have been times when I have been rather under pressure and have been compelled to work in a short space of time. At these times I have taken coffee and pure caffeine for the purpose of having more ability to do the job I had to do. I found that in my case this has been followed without any trouble or any bad consequences whatever. I have been

able to do better work and to do it in a quicker space of time and to suffer no evil consequences from it. I use caffeine-containing beverages regularly; that is, I take two cups of coffee in the morning, which will contain two grains of caffeine each, two cups of tea in the evening, fairly strong, and I sometimes take an after-dinner cup of coffee. I suppose on an average I get 4 to 5 grains of caffeine each day, and have for a great many years. Caffeine in the form of coffee and tea is used as a part of a diet in institutions for the insane. The effect of caffeine, particularly pure caffeine, where there is no complication, such as occurs in coffee, is to stimulate the mind; the man's ability to associate his ideas is increased and improved. He is enabled to do more work, intellectual work, which he could not do before, without any signs of effort; that is, he works without appreciating that he is doing hard work. He has no emotional stimulation, or comparatively very little. In that respect the effects of caffeine differ from those of morphine or cocaine, where there is emotional excitement. So far as his judgment and memory to recall ideas is concerned, it is improved; and of course all his intellectual operations are stimulated and increased by the effects of caffeine. I do not consider these effects injurious. The length of time it takes the effect of a given quantity of caffeine to disappear from the system depends on the individual case and also on the circumstances under which it is taken. The time is variable. I do not think any reasonable amount of caffeine is retained for more than several hours, but I would not wish to answer that definitely. Caffeine produces sleep in a tired brain in which the breakdown of the nervous tissue remains and is not removed by the introduction of fresh blood. This matter is removed and excreted, and of course, the toxic conditions being removed, sleep follows. In my opinion, there is nothing in caffeine or in caffeine-containing beverages that might affect an unborn child or have any effect on the progeny of people who take it. Caffeine produces nervous symptoms in some people; that is, unrest, irritability, and sleeplessness.

STEWART ROBERTS, a witness for claimant testified:

I live in Atlanta; am a practicing physician; was formerly medical director of the Atlanta public schools for about a year and a half. I made an examination of 100 people in the city of Atlanta who were accustomed to use Coca Cola. I selected the subjects myself, and was assisted by Dr. Boland. My object was to select those people for examination who drank the greatest amount of Coca Cola daily, and for the greatest number of years, and in selecting those subjects it was necessary, as we went on, to use a great many because they had not drunk Coca Cola either enough daily or long enough period of time. The average number of glasses drunk by the one hundred selected was 3.1 glasses, the average time they had been drinking it was 10 years and 7 months. Effort was made to select the one hundred people from as many different occupations as possible, and we found that 34 different lines of work were represented among them. The youngest subject was 19 and the oldest 53. As a result of these examinations there was not, as far as I can tell, any defect that I could find present as a result of Coca Cola on those people. I found some who had occasional headaches, but the cause was ascertained, and in not any case was it due to Coca Cola. In the course of my practice and among my acquaintances I have been thrown in contact with people who use Coca Cola extensively, but I have never known of any case of diseases or disorders, physical or mental, due to the use of Coca Cola among them. From my experience I am of the opinion that Coca Cola is not a habit-forming beverage. Of the 100 persons examined by me, I knew some of them, and knew they drank Coca Cola, and I went to them personally; others of them

were sent to me by Mr. Hirsch, counsel for the Coca Cola Company. In drawing my conclusions as to the effect of Coca Cola I took the statements that each and all of these persons made to me as to the amount of food they consume, the amount of coffee and tea, and tobacco, and the amount of other stimulants, as being true. About 8 of the 100, 7 women and 1 man, were paid by me for being examined. The rest were glad to be examined. My statement that no nervous disorders were produced in them by caffeine was based in part on what the subjects told me.

I wrote the letter which appears on page 3 of a pamphlet issued by the Coca Cola Company, certifying to the virtues of Coca Cola. In 1907 I was professor of physiology in the Atlanta School of Medicine, and Judge Candler wrote me and asked me as a professor of physiology to state the physiological effects that the beverage Coca Cola and the beverage coffee and the beverage tea would have on human beings. I received compensation for writing the letter.

**J. E. PAULLIN**, a witness for the claimant, testified:

I am a physician and live in Atlanta, Ga.; received my medical degree in 1905, and have been practicing in hospitals and in private practice since then. I am pathologist of the Georgia State Board of Health. I assisted Dr. Roberts in making examinations of the 100 subjects in respect to the use of Coca Cola.

**E. BATES BLOCK**, a witness for claimant, testified:

I reside in Atlanta, Ga.; am a physician; graduated in 1895, and have been practicing since. In my practice and among my acquaintances I know many people that drink Coca Cola. I have never known of a case in my practice of physical or mental disorder resulting from the use of Coca Cola by any person. My specialty is nervous and mental diseases. I would not, as a rule, give caffeine to nervous people. I think, as a general proposition, that the administration of caffeine to a person with a tendency to nervousness would be to induce or intensify the nervous temperament. I have never treated any person whose affliction was due to drinking Coca Cola. I have asked patients as to tea and coffee, but I can not recall positively whether I ever asked them specifically in regard to Coca Cola, but I have had them volunteer the information that they drink tea and coffee and Coca Cola, and ask me if they were injurious. I have forbidden some of my patients from taking caffeine-containing beverages, such as coffee, because in some people who are afflicted with restlessness or sleeplessness I find this may be due to caffeine containing beverages, and I asked them to know.

**T. B. HUBBARD**, a witness for claimant, testified:

I live in Atlanta, and am a practicing physician; I have been practicing since 1902. I have never found any physical or mental disorder or derangement resulting from the use of Coca Cola or any other caffeine-containing beverage. It has not been my experience or observation that Coca Cola or other caffeine-containing beverages are habit forming.

**B. B. WEISBERG** and others, residents of Atlanta, testified that they had experienced no ill results from Coca Cola taken at the rate of two to five glasses per day.

**HOBART AMORY HARE**, a witness for claimant, testified:

I live in Philadelphia, Pa., and am a physician. I graduated at the medical department of the University of Pennsylvania in 1884, taking the degree of M. D., also taking from said university the degree of bachelor of science. I have studied in Leipzig, Switzerland, and London. In 1890, after having been

in charge of the department of children's diseases in the University Hospital for several years, I was made clinical professor of diseases of children in the University of Pennsylvania, and in 1891 I was made professor of therapeutics and materia medica in the Jefferson Medical College of Philadelphia, and I still hold that position. I published a textbook on therapeutics, now in its thirteenth edition; a textbook on diagnosis, now in its sixth edition; and a book on the practice of medicine, now in its second edition. Caffeine acts as a mild stimulant on the body. The dose prescribed in the U. S. Pharmacopœia is 1 grain. The doses of the Pharmacopœia are supposed to be average doses. This dose, taken in the form of a beverage, would have very little effect upon a man. The Pharmacopœia dose prescribed in other countries ranges from 5 to 20 grains. I use tea constantly and use caffeine every day.

There are people who can drink one form of caffeine-containing beverage and can not take another; for example, some people can drink tea and not coffee, and vice versa. In the case of those who can drink tea and can not drink coffee, it is due to the presence of the empyreumatic oil. In the case of those who can drink coffee and can not drink tea, it is due to the presence of the tannic acid in the tea which produces disorders of the digestion. I take from one to four grains of caffeine per day. For a time I drank Coca Cola regularly immediately after breakfast, in place of a cup of coffee or some other stimulant before going into my consulting room. During six months I took anywhere from one to four glasses a day. It produced not the slightest injurious effect upon my health, and I gained twelve pounds while taking it. I use caffeine in my practice as a physician constantly, as a stimulant to the general nervous system, in cases of depression to improve the action of the heart in persons who are over fatigued, played out; to increase the activity of the kidneys where the urinary secretion is not as free as it should be; to relieve certain types of headaches and eye strain. Caffeine is not a poison, nor does it have any permanent effect. I base the statement that caffeine is not a poison upon the fact that I have administered it in very large doses without seeing that it produced any symptoms that would justify classing it as a poison. I have taken it myself in several times the dose ordinarily indicated as correct in American and English textbooks without being poisoned, and I can not find any cases in the literature which justify such a classification. In the case of poisoning which did not come to the point of death the doses were either very large or they were poorly reported, and the fact that caffeine is found in certain books classed under the head of poisons or with many substances which are ordinarily known as poisons is of no particular significance. The use of caffeine as a stimulant is not followed by depression, nor is caffeine ever a habit-forming substance, nor does it have any cumulative effect in the slightest degree.

The conclusions that I draw from experiments made by Dr. Wood, are that caffeine increases the muscular ability to work without producing any secondary depression, and without impairing what is sometimes called the reserve energy of the muscles. In other words, it has very much the same effect upon the efficiency of muscles as oiling machinery has upon the efficiency of the machinery. It enables them to expend their energy with less effort. I planned the scope of the experiments testified to by Dr. Hollingsworth, and during their performance investigated the results that he was obtaining and made further suggestions and improvements in the method. I draw identical conclusions from those experiments that I did from those made by Dr. Wood, except that his deals with mental processes, and Dr. Wood's dealt with muscular. It is still open to debate as to the effect of caffeine on blood pressure. In my own book, I state that caffeine raises the blood pressure. The text of the book was prepared in the latter part of 1908, and a number of researches

have been published since then, and many of them before that, which contradicted that view, and I think that is still cloudy. I do not think it is determined. I do not think that caffeine ever produces arteriosclerosis. I think the longer caffeine is taken, the more it is tolerated, and that a person accustomed to taking it can take more without any effect than one who is not accustomed to it, which is the rule in regard to practically all of the alkaloidal drugs. Assuming that 0.21 of 1 per cent of caffeine is present in one ounce of Coca Cola, mixed with six or seven ounces of water, and in that form taken as a beverage, the effect upon the human system would be pleasant, and the influence refreshing. It might increase somewhat the flow of urine. Experiments on animals are indicative of what possibly may occur with the same substance as given to man, but only collaterally so, and the great difficulty in the demonstration of the influence of a drug like caffeine upon the human being by administering that drug to a rabbit or a guinea pig, or to a frog, is that none of those animals are omniverous, that is to say, eat everything, as man does. In the case of the rabbit and the guinea pig, they are vegetarians, and their processes of nutrition are limited therefore, to dealing with vegetable substances, of which, of course, caffeine is one, and human organism is able to handle meat and vegetables of all kinds, and therefore there is no animal which affords a true and accurate representation of what a drug can do, unless it be a pig, which is also omniverous. I admit having used the following language in my *Practical Therapeutics* (13 ed., 1909) in regard to the effects of caffeine:

"Caffeine acts as a rapidly acting stimulant, exerting its chief influence on the brain and spinal cord. By its cerebral effect it causes increased rapidity of thought, and by its influence on the spinal cord it increases the reflex activity, and for that reason it is said to make people 'nervous.'"

And again:

"It is important to remember that it has no effect on the brain protoplasm except to stimulate it, and that ultimately a brain driven along by caffeine breaks down by the concentration of its energy in one effort."

There is no question about caffeine being a "rapidly acting stimulant," and in stating that it is said to make people "nervous" I am quoting the opinion of others. The words "a brain driven along by caffeine," etc., were put in with particular reference to medical students, who frequently, before coming to my examining room, were in the habit of attempting to study for two days and two nights without any sleep whatever and who took strong coffee—sometimes every hour—to keep going.

W. S. HAINES, witness for claimant, testified:

I live in Chicago; am a doctor by occupation, a professor in the Rush Medical College of Chicago and the University of Chicago; have been in the former 35 years and in the latter for the past 10 years. I have experimented with a considerable number of lower animals with a variety of substances. In January, 1910, I made experiments upon guinea pigs for the purpose of ascertaining the effect of caffeine. After the tests had been made the animals were killed in all cases by the use of chloroform, and immediately afterwards their bodies were taken by me to the laboratory of my colleague, Dr. E. R. Le Count, and I watched him make a post-mortem examination of each of them. The animals were weighed at frequent intervals; that is, those that had been given caffeine and the control pigs which had not been given caffeine. The test pigs received  $\frac{1}{30}$  to  $\frac{1}{4}$  of a grain of caffeine daily—a quantity representing 10 grains of caffeine to a man weighing 150 pounds. There was fluctuation of weight in both sets up and down. There was, on the whole, a steady pro-

gressive increase of weight in both sets, but there was some fluctuation. It was clear during the experiments that the animals taking the caffeine were more restless than those that did not receive the caffeine. I came to the conclusion from the effects on them that I was giving them more than was necessary to secure the data I was seeking, and I therefore reduced the quantity on the 27th of January to  $\frac{1}{60}$  of a grain; that is, the quantity corresponding to 5 grains administered to a man weighing 150 pounds. From that time no irritability of the animals was shown. As the animals increased in weight the dose of caffeine was increased. The experiments were conducted over a period of one year and two days.

E. R. LE COUNT was recalled, and testified that he examined the lungs, heart, spleen, thyroid gland, the salivary gland, liver, pancreas, stomach, alimentary canal, kidneys, suprenal, and the generative organs, and in some instances the bone marrow, and also the brain and spinal column of these animals, and found no evidence of chromotolysi.

SAMUEL P. SADTLER, a witness for claimant, testified:

I live in Philadelphia, and am a chemist; a graduate of Harvard University, having taken my scientific course in the Lawrence Scientific School in 1870. I went to Germany and made my doctor's degree at the University of Göttingen, and I returned here in the fall of 1871, and since that time have been engaged in the teaching of chemistry. I analyzed two samples of Coca Cola syrup. I found 0.21 of 1 per cent of caffeine in the fountain syrup, which amounts to 1.02 grains per fluid ounce, and 0.20 of 1 per cent in the bottler's syrup, which amounts to 1.18 grains per fluid ounce. I visited Maywood, N. J., and witnessed the manufacture of Merchandise No. 5. I also made an analysis of it, and found it to be free from cocaine. I found it to contain definite quantities of caffein, and a small amount of theobromine, and to give certain reactions indicating tannin. I made experiments to recognize the several constituents of No. 5; that is, the cola extractive matter, including the tannin, and the tannin of the cola nut, and also the coca leaf extractive matter, and the cola extractive matter.

CHARLES H. RECKEFUS, a witness for claimant, testified:

I live in Philadelphia; am a physician, and have practiced for 18 years. I have been drinking Coca Cola as a beverage since 1893; during 11 months of the year, since 1895, I have never drank less than six glasses. Coca Cola has not affected or injured my health in the least, but, on the contrary, as I think, is very beneficial.

F. K. BOLAND, a witness for claimant, testified:

I live in Atlanta; am a practicing physician, and have been such for 11 years. In my practice in Atlanta and among acquaintances I am thrown in contact with people who habitually use Coca Cola. I have never observed any effect it had upon them. I have never known of a case in which disease or impairment of health, either mental or physical, has resulted from the use of Coca Cola. I do not think Coca Cola is a habit-forming drink.

RAYMOND WALLACE, a witness for the claimant, testified:

I reside in Chattanooga; I have been practicing medicine for 8½ years. Coca Cola is sold and extensively used in Chattanooga. I have never known

of any case of injury or impairment of physical or mental health resulting from the use of Coca Cola.

C. J. GOODING, a witness for claimant, deposed in a deposition, which was read in evidence, as follows:

I live in Knoxville, Tenn.; am a druggist, and have been engaged in the business 36 years in Knoxville. I operate a soda fountain in connection with my drug business, at which I sell Coca Cola. I have known this drink for about 18 years. The Coca Cola I sell is diluted with carbonated water. The syrup is made in Atlanta, by the Coca Cola Company. I mix the syrup and water in proportions of one ounce of syrup to seven of water. There has never been, to my knowledge, any other drink placed on the market known as Coca Cola, except that made by the Coca Cola Company, in Atlanta, Georgia. I handle about 750 or a thousand gallons of Coca Cola syrup a year. From my observation I should say that the average number of glasses of Coca Cola a day taken by a person who drinks it is from one to two, possibly three. I have never seen whether or not Coca Cola creates in a person who drinks it a craving for increased quantities. There are no children who drink Coca Cola at my fountain. Coca Cola forms about  $\frac{2}{3}$  of the drinks sold at my fountain. There has never been, to my knowledge, a case of any person being injuriously affected by drinking Coca Cola. I drink it myself, and have been drinking it for 18 years. I never take more than two glasses a day. Coca Cola has never been sold under any other name, to my knowledge.

B. H. BROWN, a witness for claimant, testified:

I am a graduate of medicine. At present I have charge of the laboratory of the Sprague Dairy Company, at Chattanooga. I was city food inspector for three years, until August, 1910, when I went with the Sprague Dairy Co. While I took the degree of M. D., I have never practiced. The first three years after graduation I was in New York, doing clinical work in the hospitals of New York, and when I came back to Chattanooga I took the position of food inspector. I assisted Drs. Wert and Holtzclaw in making an examination of 100 people in the city of Chattanooga last year who were accustomed to use Coca Cola. The largest number of glasses per day taken by any one of these persons of Coca Cola was 15 glasses; two said they drank from 12 to 15 glasses; the average number was 2.48 per day. The examiners endeavored to get those who used the largest amount of Coca Cola. All of the persons examined were males; the average age was 24.57 years; the oldest person was 56 and the youngest 14. The reason we did not have any females as subjects was because the examination was such that we did not believe we could get them to submit to it. As the result of these examinations, we found no subject suffering from any complaint, ailment, or physical condition that could in any way be attributed to the use of Coca Cola. I have never seen any person among my acquaintances suffering from any derangement or ailment that could be traced to the use of Coca Cola.

C. HOLTZCLAW, a witness for the claimant, testified:

I am a practicing physician in Chattanooga and have been for 30 years. I participated with Dr. Brown in making the examinations to which he has just testified. To the best of my knowledge and belief, as a result of these examinations, none of these persons suffered from any derangement of the system or physical condition which could be traceable in any way to the use of Coca Cola,

J. W. JOHNSON, a witness for claimant, testified:

I am a practicing physician and have patients and acquaintances who drink the beverage known as Coca Cola. I have never treated any person for any disease or ailment due to the use of Coca Cola, nor have I ever known of such a case.

B. S. WERT, a witness for the claimant, testified:

I am a practicing physician in Chattanooga, and have been for 30 years. I participated with Drs. Brown and Holtzclaw in making the examinations of which they have testified. I personally knew many of the subjects examined. I knew probably 25 or 30 of them. I should think there were at least 30 or 40 different vocations represented among them. Many of them were sedentary vocations. As a result of these investigations none of these subjects were found to be suffering from any complaint or ailment that could be traceable to the use of Coca Cola.

E. DUNBAR NEWELL:

I am a practicing physician in the city of Chattanooga, and have been practicing here two years. I have practiced altogether 13 years. Coca Cola is extensively sold in this vicinity. I have had occasion to observe among my patients and acquaintances people who use it, but have never seen a case of any ailment or disease that resulted from the use of Coca Cola. From my observation and experience I should say that Coca Cola is not a habit-forming substance.

E. E. REISIN, a witness for the claimant, testified:

I am a practicing physician, graduated May 1, 1906, and have been practicing in Chattanooga about three years. I have been thrown in contact with patients and acquaintances who use Coca Cola and have had occasion to observe the effects of it on them, but have never seen anyone that had any disease or ailment that could be traceable to the use of Coca Cola.

T. P. SHEPPARD and numerous other witnesses, residents of Chattanooga and vicinity, testified they had used Coca Cola daily and experienced no evil effects from it.

J. F. JOHNSON, recalled as a witness for claimant, testified:

The Ruth Glass Company, of Terre Haute, Ind., and the Chattanooga Bottle & Glass Mfg. Co., of Chattanooga, Tenn., furnish the bottles in which we put up the syrup, and the tops to the bottles are furnished by the Crown Cork & Seal Company, of Baltimore, Md. The Coca Cola Company has nothing to do with procuring either the bottles or the tops. The bottles in which the hyphen was left out between the words Coca and Cola was by accident; we instructed the manufacturers to keep the name on the bottles as contained in the trade mark. The tops that were used in 1909 and 10 have the hyphen between the two words. I do not know how it happened, but there was no intention of getting such top on our part.

OSWALD SCHMIEDEBERG, a witness for claimant, whose deposition was taken on March 20, 1911, at Kehl, Baden, Germany, and read in evidence, deposed in substance as follows:

I am residing at Strasburg, Alsace, and my occupation is professor and director of Pharmacological Institute in the University of Strasburg, Alsace, since 1872. I am doctor of medicine and honorary doctor of laws at the University of



Edinburgh, Scotland; corresponding member of the Royal Society of Medicine, London, and of the Philadelphia College of Pharmacy; honorary member of the English Physiological Society; honorary and corresponding member of many other academies of science and medicine in Germany, Austria, Italy, France, Russia, and Sweden. My particular branches of medical science are pharmacology, materia medica, and toxicology. Caffeine in Coca Cola syrup can not act otherwise and is not to be judged otherwise than caffeine in general. Caffeine is a constituent upon which depends the significance of coffee, tea, and some other food materials. Notwithstanding the wide distribution of these beverages, cases of illness from their use which can be held to be due to their content of caffeine are not known. Caffeine in the quantity in which it is taken with these beverages may be with entire certainty set down as harmless on the basis of the experience obtained on so large a scale during several centuries.

Caffeine in the quantities in which it is taken with beverages so acts upon the nerves and muscles that the feeling of fatigue disappears, while the stimulus of the will more easily irritates the muscles, and the supply of energy of the latter can be more easily and efficiently used than in the condition of fatigue without caffeine. Under the influence of the latter, also, the more strenuous intellectual activities are more easily prolonged and the feeling of mental lassitude is less perceptible. Caffeine is a means of refreshing bodily and mental activity, so that this may be prolonged when the condition of fatigue has already begun to produce restraint and the calling for more severe exertion of the will, a state which, as is well known, is painful or disagreeable. The caffeine as commonly known in beverages does not spur the muscles directly to increased activity; therefore they are not necessarily exerted when caffeine is taken in such quantities. The caffeine in quantities stated affects the muscles and nerves indirectly by increasing the irritability, and they respond more readily to every irritation. The use of caffeine in quantities stated in consequence of increased irritability enables the muscles and nerves to respond more easily to the impulse of the will. Its use in the quantities stated would not induce activity of the muscles and nerves without the cooperation of the will. According to the communications which have reached me, about 30 gram—1 oz. of Coca Cola syrup, containing about 1.21 grains caffeine, is used to a glass of about 210 cc of the beverage. From the stated quantities of the caffeine which are taken daily by the use of coffee or tea, it follows that 6½ to 13 glasses of Coca Cola might be taken daily without any fear of injury to the health from the quantity of caffeine contained therein.

Decisions of the United States district courts adverse to the Government will not be considered final until acquiescence shall have been published.

JAMES WILSON,  
*Secretary of Agriculture.*

WASHINGTON, D. C., *February 25, 1912.*

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